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Abacus

A Journal of Accounting, Finance and Business Studies

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$US10,000 ANNUAL MANUSCRIPT AWARD

EDITORIAL

To coincide with its ISI listing the owner of *Abacus*, the Accounting Foundation, has announced that beginning in 2007 it will fund a $US10,000 Annual Manuscript Award for the best article published in *Abacus* in each calendar year. The first award will be announced in the March 2008 issue based on articles published in 2007. The criteria of the award will reinforce the journal's continuing decision-useful focus explicit in its objectives, namely to publish exploratory, constructive and critical articles on all aspects of accounting and on those phases of the theory and administration of organizations and of economic behaviour generally which are related to accounting, finance and business studies. That focus was the vision of the journal's founder, Ray Chambers.

The process for determining the award will entail an initial screening of the articles published each year by a panel of four academics including the editor, the consulting editors (former editors of the journal) and another member of the Editorial Board to provide a short list. Those articles will then be viewed by a panel comprising the president and the director of the Accounting Foundation, a member of the Editorial Board and a practitioner member of the Council of the Accounting Foundation. If any of the evaluating members have an article under consideration they will automatically stand down from the reviewing panels.

The award will be presented to the winner at a special function each year to be held either in Australia, Europe or America, depending on the domicile of the winner. The announcement of the Annual Manuscript Award coincides with the completion of Stage 1 of the Chambers Collection (details of which were outlined in an insert that accompanied the September/December 2006 issue).[1] The Collection contains many of Chambers' bon mots contained in his addresses or seminars, all of which are documented in his 'Aide Memoire' (reproduced in *Abacus*, October 2000). Some of these have been drawn upon in my recent editorials.

Another address, 'Accounting 1984', which Chambers delivered in 1964 to Australian Society of Accountants members, is reproduced in full as part of this editorial. It is germane to the announcement of the manuscript award as Chambers highlighted there the importance of ridding accounting of its solecisms and its illogicalities if it is legitimately to join the ranks of the other learned scientific disciplines and to serve society as a fruitful information technology. He set a twenty year timetable—'George Orwell's year'—for the required changes to be made by the profession. The events of the last decade with the accounting irregularities revealed at Enron, WorldCom, Parmalat, HIH (and others) shows that now, twenty-odd years after

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[1] For a comprehensive overview of the characteristics, accessing and potential uses of the collection see Dean *et al.* (2006).

Chambers' self-imposed 1984 deadline, there is still much to be done. They show that Chambers' hope expressed in 1964—'The twenty years ahead of us give us all time to bring to pass the long overdue change from plasticity to firm principle, from subservience to service'—remain largely unfulfilled. The manuscript award, with its decision making and evidence-based research focus, coupled to a substantial stipend, marks the Accounting Foundation's attempt to maintain the passion, the desire to search for excellence, and the emphasis on researching practical accounting and business issues so eloquently captured in this address.

ACCOUNTING 1984[2]

In selecting the title of this paper, it may appear that I am assuming the role either of the seer or of the critic. And indeed I am to some extent. But I do not wish to paint the rather forbidding pictures in the style of Karl Marx or of George Orwell. I rather hope that there may be something perhaps of the style of Jules Verne, for I cannot accept the future of accounting as anything else but adventurous. The period I am thinking of is limited; it has only twenty years to run, at the end of which I will still be in harness. In these circumstances it is rather risky to be too visionary for my words may yet be flung back in my face. However, I have some convictions about what should happen and what may well happen; it is these I wish to share.

Before we turn to the prospect we will lay the foundation in retrospect. Accounting has traditionally been regarded as an art, to be learned by observation and practice. This view is still strongly held and finds its expression in professional and individual statements emerging from the self-directed question: 'Is accounting an art or a science?' Now in the first place, the question itself is a pseudo-question: It is based on the notion that a class of activity can be either an art or a science but not both, or alternatively on the notion that art and science are the same kinds of things. Neither of these notions is warranted. There is a body of knowledge relating to medical practice which may be styled medical science; but the practice of medicine is an art. There is indeed an art in scientific discovery itself; but the art is not the substance of what is discovered. Beveridge's book, *The Art of Scientific Investigation* (London: Heinemann, 1951), gives ample evidence of the extent to which investigation is an art, a disciplined art, quite distinct from its product. The art lies in the imaginative conception of relations, the intuitive grasp of what appear to be irrelevancies, the putting together of old ideas in novel combinations—all subject to whimsy, accident and at the end plain hard work. Until we accept the idea that there is an art of accounting, the practitioner's art, and a science of accounting, the body of knowledge on which the art is based, accounting is unlikely to free itself from the notion that all that can be learned can be learned in practice.

There are of course many things that can be learned by practice and in no other way. But few of them extend beyond routine skills. Not only that; once one abandons what is routine for deliberate thinking, or even when one routine is abandoned for another, the old skills are forgotten. We learned in secondary school to analyse sentences, to write and to speak a foreign language perhaps, to perform some quite skilled mathematical operations. But if we have not had to do the same things since those special skills are lost. In the field of accounting or the work of commercial offices there are perhaps many routine skills. But if we think that is all there is we forego the opportunity of being anything else than mechanisms. By all means insist on learning of routine skills by practice but never forget that that is all that practice will make perfect.

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[2] Address delivered to the Australian Society of Accountants function in Hobart, 20 July 1964 (This version was typed by Angelika Dean from handwritten cards from material in The University of Sydney Archives, USA P202/08631.)

Those who insist that a professional competence can be developed in this way, however, are closing doors which should rather be opened. The amount of knowledge we can acquire by practice is limited indeed. By knowledge we mean an orderly and systematic understanding of the elements which underlie and determine which practices shall be employed. The characteristics of order and system do not emerge from the limited experiences one may have in five, ten or twenty years of practice. Order and system are the product of comparison, of analysis, of criticism, of deliberation. It would be odd indeed if busy practitioners were able to engage in the reflection and self-examination necessary to develop order and system; and let's be frank, few think it necessary. But suppose they did. Their experiences being limited to their own practices, their own clients, their own habits, are scarcely wide enough to provide an adequate basis of comparison and criticism.

The upshot is obvious in the contemporary practices of accounting. The number of conflicting methods of valuing inventories and calculating depreciation allowances employed today is evidence of lack of order and system. We say conflicting methods deliberately, for quite clearly two such methods of stock valuation as cost on the one hand and market replacement price on the other imply quite different and conflicting conceptions of financial position and business income. The multiplicity of methods is a measure of the multiplicity of conflicts and the magnitude of confusion. All these methods are presently acceptable because someone, somewhere once used each of them in practice, not because they are demonstrably reasonable.

The foundation of an orderly and systematic knowledge is an understanding of the kind of society in which accounting is practised and the function it performs in that kind of society. Questions relating to these matters are indeed sometimes asked, but seldom answered. In quite recent years officials of professional organizations have more than once deplored the fact that there is no clear understanding of what the function of accounting is. The lack of clear understanding is evidenced by the arguments about cost-based and value-based accounting, about the price level problem, about the superior importance of the income statement or the balance sheet as the case may be. But the recognition that there is no common understanding of the function accounting performs in our kind of society augurs well for the future. In the next twenty years we may resolve the matter.

We will make a beginning right now. Insofar as we are all choosers, decision-makers if you will, we are all valuers. In the next twenty-four hours each of us will make many choices between alternatives. Those choices will all be based in part on the relative values we attach to the consequences of our alternatives. No one else can do our valuing for us at the personal level. Valuation is everybody's business.

But there is one thing which we all must know before we can consider alternatives. And that is which alternatives are available to us in our present state. In the present state of technology it is not open to me to choose whether I shall sleep tonight in Hobart or London. And even if it were technologically possible the state of my pocket book prevents me from choosing to sleep in London. In short, one's present financial position always limits the things one can consider as available alternatives in the immediate future. So that although we are all valuers there are limits to what we can reasonably expect to do—and in a market economy having a monetary medium exchange, the limits are given by our present financial positions.

Now whether I value a bed in the Dorchester, London, or a bed in the Wrest Point, Hobart, in no way determines where I am now. Valuations do not determine present positions. Present positions determine what it is sensible to evaluate. To obtain my geographical position now I would have to make certain measurements with reference to some base points. Similarly, to find my financial position I have to make certain measurements with reference to some basis. We stipulate that in a market economy financial position is given by the relationships between measurements of assets and measurements of equities on the one hand and by measurements of the different kinds of assets and equities on the other. The measurements are of the cash equivalents of assets and equities; and the scale of measurement is the monetary unit or more correctly the present purchasing power of the monetary unit.

I go no further with this. The important thing I wish to establish is that there is a function antecedent and necessary to all choices and all valuations of alternatives. It is a measurement function. It is not a valuation function. In a world of specialization, acting men may have other people to make their measurements; but the right to act, to choose, to evaluate they keep to themselves. I therefore suggest that the function of accounting is this function of measurement, the function of ascertaining the facts, the presently pertinent facts, the kinds of facts which are the necessary foundation of all actions in marketplaces—even though there are other facts which also bear on those actions.

This may seem a novel view and indeed it is. But as valuation is everybody's business, this view is the only one which justifies the specialism of accounting. Let us see what some of its consequences are. If we set out to measure we engage in a pursuit which is common to many sciences. We do not imply that to be scientific we must measure. We do want to suggest that the problems of accounting are of a piece with the problems of other fields of scientific inquiry. We shall therefore have to learn something about measurement. We begin to realize that accounting is not so different from other fields as we have supposed. But it is a peculiar field, for no other scientific field has the same problems of a varying measuring unit as is the monetary unit. And no other field has the same problems of running a continuous record in spite of such changes in the unit as does accounting. Thus although it may seem simple to say we measure, the task is far from simple. Many writers on accounting have written about measuring assets and income and so on, but they have never stopped to ask themselves what measuring means. In the next twenty years I expect that there will be considerable attention paid to this question and that we may expect some precision to emerge from this in place of the looseness of contemporary thinking.

There has been a great deal of confused thinking about the accountant's role in respect of management or decision making. Much of this seems to have stemmed in a vague way from the supposed linkage of accounting with economics. I want to suggest that the linkage is different from that so often supposed.

The subject matter of economics is economic behaviour. A great deal of it is concerned with explaining behaviour in terms of expectations, environmental factors and so on. In the literature of economics generally much is made of the valuation of alternatives. But almost universally it is taken as given that the chooser has access to the facts. Richardson (*Information and Investment*, London: Oxford University Press, 1960) is one of the few who have dared to challenge this assumption. He is more concerned with the external facts—the state of the market—than with the facts of a given firm itself. But when discussing liquidity he argues that even the common measure of liquidity—the relationship between current assets and current liabilities as they are currently shown in accounting—does not really represent liquidity by reason of the accounting methods used. Likewise, Andrews (*Manufacturing Business*, London: Macmillan and Co., 1949) dismisses all other representations in balance sheets than current items as being pointless as information currently relevant to behaviour. By implication these writers are therefore questioning the businessman's or the accountant's representation of income. I find it impossible to understand how economists can speak of choosing among alternatives unless they take cognizance of the availability of the facts. And this they do not. Andrews, Samuelson and Bach give brief treatments of conventional accounting in their economics texts, but despite the inconsistency of the economic notions of income they put forward with the results of the accounting process they describe they make no comment. In a sincere but rather condescending way Boulding says accounting may produce untruths but not lies, and so long as we understand that they are untruths we can take our own precautions. I find it hard to know what the philosophical difference between untruths and lies is, and equally hard to understand what precautions one can take—to lies or untruths.

What is more, much of the literature of economics and accounting has become befuddled by the use of the word 'value'. On many occasions, one never quite knows whether one should think of value in the sense of future valuation or value in the sense of present price.

There is a good deal of room for tidying up here. To make their models operational economists must have some theory about the accessibility of information—the facts. And they should have some theory about past income measurement as well as income expectations if they are to know in what the facts consist, or even to know what they mean by maximizing income, whether or not they accept maximization of income as a criterion of behaviour. On the other hand accountants have to realize that as economists are mainly concerned with future choices their concepts are not transferable to measurements of the past. For example, replacement cost is one of the notions which is pertinent in evaluating alternatives. But in accounting replacement cost has strictly no place. A firm's financial position is independent of any question about replacement. In an adaptive society replacement may never be effected; and even if it is contemplated, it can only be contemplated in the light of an independently determined financial position at the time. There seems to be very good reason why accountants and economists should tidy up their fields of mutual interest—not by conference or committee but by the disciplined attempt to find their common foundations in the discovery of the facts. Here is another task for the next twenty years.

It seems to me that in their anxiety to be in the decision-making business accountants have sought for the glamour of the management cachet and neglected their *amour propre*. Much talk of accounting for the future is pointless when we take no care about the facts on which the future is based. We dodge the difficulties of disciplined discovery for the pleasures of planning when we pay attention to the future and disregard the measurement problem. The kind of accounting we envisage is Janus-like, looking backwards a full representation of the effects of the past, looking forwards a firm basis for the elimination of impossible alternatives. Accounting of this kind has another of the elements of scientific inquiry.

One of the objects of scientific inquiry is to discover the laws or principles on which we are entitled to rely in the future. These laws are not immutable; they are human formulations, subject to restatement as further knowledge becomes available. But in the absence of further knowledge they are held and valued because of their predictive power. So with accounting. The discovery of present financial position is significant because of its predictive power. It does not predict what any given person will do with the knowledge; neither does any physical law. But it does predict the limits of the actions that are available, and that is precisely what physical laws do. The 'law' that water boils at 212°F does not predict that any one will boil water; it predicts boiling if one has sufficient fuel or other energy to raise the temperature to 212°F under certain conditions. In the world of business and commerce of course there are no constants such as are found in some physical laws. So the problem of continually discovering the constraint of future action arises. The process is one of continual search, that is of research. Accounting is ideally concerned with nothing more than continually restructuring the knowledge of people operating in markets.

Accounting of the contemporary variety falls far short of this ideal. Yet without it businessmen are in part blind. Not only that, they are blinded by the present conventions of auditing. Now the function of auditing strictly is authentication or corroboration. There is no legitimate excuse for an auditor who is a rubber stamp. The whole notion of independence of inquiry is at the root of scientific knowledge. We consider a thing to be known if it has been independently corroborated by someone of the requisite knowledge and skill. All scientific experiments and their conclusions are subject to doubt until some other person or persons has independently carried them out and corroborated the findings. Now this depends on the findings themselves having certain characteristics. They must for example be capable of corroboration. In other words they must be objective, and by objective we mean free of any personal element not common to others. If then an accountant exercises a judgment or a person[al] valuation, or even a valuation peculiar to accountants in making up accounts, the result is not capable of corroboration—for it involves a personal element not common to users of accounts—and in the end these are the persons for whom accounts are prepared. If thereafter an auditor finds that a judgment or valuation has been made, he is in no position to corroborate the judgment for judgments are personal—they are not interpersonally testable. Even if the auditor were to say, 'I agree with the accountant's judgment' this would be beside the point. For users of accounts do not want to know whether the accountant's judgment is good or bad—they want to know whether the facts are fairly represented by the accounts, whether the accountant is good or bad or indifferent. I am not at all impressed by the quibble that auditors do not certify or verify, they only report. Their only function is to verify, to authenticate, to give assurances about representations of facts. It is small wonder that auditors come under open censure from time to time if they fail to see that their scientific function (their function in relation to the discovery of reliable knowledge) and their social duty is to authenticate the statements of others.

I think and I feel sure auditors often think they are looked upon as a necessary evil. And insofar as they spend their time being pernickety about trivia they are an evil. But if they were to assume the responsibility of rolling back the tide of confusion which threatens to swamp the reason of anxious men, if they were to cherish the role of scientific corroborators of statements about facts, and were to prepare themselves to fulfil it, they would deserve a degree of professional respect which they do not believe they are now accorded. The view has nothing to do with conflict with management. If management will not disclose the facts, or insist that accountants find the facts, it parades itself as the only group whose opinions count—quite inconsistent with the self-determination by others, and in the end self-defeating—for managers are also substantial users of accounting information. The duty of the auditor is a duty to all in the same way as is the duty of the scientist. The next twenty years I fancy may well see a marked change in the attitude towards audit. If the profession prepares itself for the function I describe it will recapture the prestige due to socially necessary experts. If it fails it will wither on the vine.

Nothing I have said should be taken to imply that accountants should not concern themselves with anticipatory calculations, as experts in monetary calculation. But to do so effectively implies they are experts. My last observations will be about the internal calculations which go by the name of cost accounting or managerial accounting. Economists have long assumed that acting men operate on the so-called marginal principle. They consider what change is likely to occur in a given situation if one element of the situation changes or is changed. This seems to be an eminently reasonable principle. One never wants to change everything at once; and if one were to think of doing so the interrelationships of effects would be so complex as to be beyond mastery by finite minds. Now absorption costing or full costing implicitly assumes that all factors are open to change in the short run—that businessmen are able to choose between alternatives on the basis of full costs. There have even been some economists who, professing to observe the real world, have concluded that full cost pricing for example is a common business practice. Hall and Hitch in England and Lester in the U.S. however failed to take account of anything but the obvious superficial features of their studies. Now, you may say that accounting is moving slowly towards marginalism. Undoubtedly but far too slowly. But furthermore, costing calculations are still largely based on conventional financial accounts of a historical nature, and though we learn from experience, by what is past, we are foolish to extrapolate past experience. There seems to me to be no question that before we begin to design costing systems we have a lot to learn about the relationships between experience and prediction, about *ex post* judgment of performance, about the economic realities which force us now to consider one thing, now another, but seldom if ever everything at once as an interconnected whole. It seems to me that in the next twenty years we must make some progress on this front.

What about 'Accounting 1984' then? It seems to me that accounting is on the threshold of considerable advances. By 1984 I would hope to see accounting practices, the art of

> accounting, firmly founded on the basic sciences. Because accounting is a measurement system capable of drawing our visions back to the level of reality and practicality, because it is a device used in a socioeconomic context, the basic studies seem to me to be mathematics and logic, psychology and economics, law and sociology to name the more obvious. Not that we need to know these fields as experts; but we do need to know well how dependent upon them the art of accounting is. *By 1984* I expect accounting to be seen as an integral part of scientific inquiry carried on at the level of business; no longer will there be literally thousands of ways of preparing balance sheets and income accounts, endless arguments over superficial differences and distinctions. Accountants would by then have found their role to be the discovery of contemporarily relevant facts, and in the face of the difficulties would be concerning themselves with making better and better approximations to the ideal of present relevance. *By 1984* I expect accounting to be fully reorganized by sister disciplines as a contributory to their own problems. No more the thinly veiled apologetics and excuses from the ranks of accountants and economists alike. No more talk about the difficulties and complexities, but rather a resolute facing of them. Accountants, economists, social and organizational theorists will see that their separate fields are dovetailed in the same way as the work of the world at large is dovetailed. *By 1984* there may well be fewer accountants, for the routines of information processing will clearly be passing in greater volume to computers and other devices. But they will necessarily be persons of greater skill, of wider vision, having a clearly definable expert function. I cannot foresee the time when accountants will be dispensable, for that implies the disappearance of the type of monetary and market economy with all its uncertainties in which we now live. *By 1984* it seems highly probable that, given a clear vision of their function and a professional dedication to its exercise, business will be much more efficient than it is now, because the information communicated to the many parties of interest will be more precise, less fuzzy. Instead of business settling down as it has now to a level consistent with inadequate and useless information, it will be kept on its toes by the flow of pertinent facts, tempering the judgment of management and all other participants in the business system alike. At a minimum, the present cost of accounting to the Australian community cannot be less than £200 million per annum—and the product is so hedged about with illogicalities, confusions and lack of sense of direction that much of it must be sheer waste. *By 1984* there will be a vast improvement in its productivity.
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> None of these things will occur without effort. I am not speaking of evolution. I am speaking rather of a revolution in ideas—something full of adventure, of rediscovery. These changes will occur only by the deliberate attempt to discipline ourselves and our subject in the manner of all other rigorous disciplines. For myself I enjoy this kind of adventure and it is at least my wish to be part of it. Accounting has been like putty in the hands of those who have sought to mould it without recognizing its socially necessary function. And like putty it has yielded. The profession will tolerate this only at its peril. The twenty years ahead of us give us all time to bring to pass the long overdue change from plasticity to firm principle, from subservience to service.

Consistent with Chambers' plea, this issue contains material on a variety of decision making and other issues drawing on several research methods. It also contains works from the two authors who have had their articles published in *Abacus* more than anyone other than the founding editor—Robert Walker and Michael Scorgie.

Walker's article on the merits of principles-based versus rules-based standards examines matters that have perplexed regulators for more than a century—namely, should all entities granted state privileges, like incorporation, be required to meet similar publicity obligations, or should there be differential reporting obligations? He concludes that with a caution: 'perhaps claims about the merits of "principles-based rules" should not be taken too seriously. The surrounding rhetoric may be appealing: "a principles-based approach to regulation focuses on outcomes rather than processes" (FSAC, 2004). In substance, such rhetoric may be interpreted as a claim for industry-self-regulation rather than government-imposed regulation—a claim that would relieve practitioners of enforceable obligations and would allow many commercial or not-for-profit vehicles to avoid accountability to stakeholders and the broader community.'

Scorgie plies his well-honed historical analysis skills to explore particulars of the first Crown Agent for New South Wales, appointed on 1 May 1787, William B. Chinnery. It is revealed that he embezzled more than £80,000 of Treasury funds before his dismissal in 1812. The analysis canvasses how over this twenty-five year period the contemporary charge and discharge accounting (and related auditing practices administered by the U.K. Audit Office) were found to be inadequate.

The issue begins with an article by Van Cauwenberge and De Beelde, 'On the IASB Comprehensive Income Project'. They analyse the merits of the proposed dual income reporting format. They conclude that such a reform should be closely considered and that experimental research should be undertaken by the standard setters to identify the likely effects of such a move.

The Tsakumis piece on 'The Influence of Culture on Accountants' Application of Financial Reporting Rules' utilizes Greece as the setting for considering whether 'Greek accountants are more (less) likely to recognize contingent liabilities (assets) than their U.S. contemporaries'. This work draws on an accounting classic article—Gray (1988)—which was the first to introduce Geert Hofstede's idea that culture affects accounting. Tsakumis finds no support for this claim. He did, however, find support for the proposition that U.S. accountants consistently exhibited more conservatism than their Greek contemporaries.

The issue concludes with a finance article by Frino, Jarnecic and Lepone, who consider the vexing question of what determines the price impact of block trades. This matter was first examined by Kraus and Stoll (1972). The additional evidence drawn upon here confirms the authors' priors that liquidity is the main driver of price impact and provides empirical evidence on a matter currently before international accounting standards setters as they examine difficulties in determining fair value measurements.

Graeme Dean
The University of Sydney
November 2006

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PHILIPPE VAN CAUWENBERGE AND IGNACE DE BEELDE

On the IASB Comprehensive Income Project: An Analysis of the Case for Dual Income Display

The IASB is presently involved in a project on reporting comprehensive income. Since the IASB accounting model mixes two income determination systems, namely, historical cost accounting and fair value accounting, an interesting question pertains to whether the display of comprehensive income should reflect the existence of these two paradigms. This article scrutinizes, from both the points of view of accounting theory and a valuation perspective, the typical arguments made by proponents of historical cost net income and comprehensive fair value income. It finds that claims for exclusive reliance on a single concept of income are untenable. The analysis provides arguments in defence of an income display that explicitly features both income concepts. Such a dual income display would correspond to a categorization of comprehensive income that is currently investigated in the IASB performance reporting project. However, given the importance of summarization in financial analysis, as is most extremely reflected in the focus on the earnings per share (EPS) number, the case for a dual income display should also be considered at the highest level of summarization of financial performance reporting. In other words, mandatory publication of two EPS numbers, one for net income, and one for comprehensive income, should be considered. Possible effects on perception and actual use of financial reports that should enter such a consideration are suggested as topics for experimental research.

Key words: Accounting; IASB; Income, comprehensive; Valuation, residual income.

Basically, an accounting system can be described as a set of rules determining recognition, measurement and display that defines a mapping of a company's financial performance and position into its financial statements. Since recognition and measurement determine when and at what amount elements should be incorporated in these financial statements, they are generally considered as the essential determinants of the accounting system. Indeed, given the standard setter's goal of decision relevance to investors, the hypothesis of stock market efficiency would even imply that display of accounting information is irrelevant. The only requirement is that the information about recognized and measured elements is available. However,

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under a semi-strong or weak form view of market efficiency, issues of presentation become important. According to the theory of bounded rationality (e.g., Libby *et al.*, 2002), physical and cognitive limitations cause investors to deviate from theoretical decision models and resort to heuristics. As a consequence, summarizations are generally relied upon instead of the complete voluminous financial reports themselves. The extensive use of the price/earnings per share or P/E ratio in valuation is probably the most extreme example of this summarization. Preparers' preoccupation with the earnings number, in the standard setting process and in financial communication, is a reflection of this focus (Beresford, 1994).

Against the background of this summarization, an interesting question pertains as to how display of income should relate to recognition and measurement if the accounting system is a mixture of two income determination systems—for instance, transaction-based historical cost accounting and fair value accounting, as is the case in the International Accounting Standards (IAS/IFRS). A 'utilitarian' suggestion might be that the income report should advance both net historical cost income and fair value comprehensive income on an equal standing so that, from the income reporting format itself, users experience no incentives to weigh one income measure more versus another in their investment decisions.

Currently, the IASB is involved in a joint project with the Financial Accounting Standards Board (FASB) to investigate the reporting format of performance. The statement of comprehensive income that is proposed therein would replace the present income statement. Next to integrating all sources of income, an important goal of the statement of comprehensive income is to categorize income components in a way that is useful to investors (IASB, 2005b). One categorization that has been suggested in the course of the project (Joint International Working Group on Performance Reporting, 2005) and has gained considerable academic interest (Newberry, 2003; Barker, 2004) is based on the division between historical cost income and fair value income (remeasurements). Accordingly, the statement of comprehensive income would contain a subtotal based on historical cost income (i.e., excluding fair value remeasurements) while the total comprehensive income would include fair value remeasurements. Such an approach would thus explicitly feature both measurement concepts. However, given the importance of summarization in financial analysis, as is reflected in the focus on the earnings per share (EPS) number, the case for a dual presentation format of income should also be considered at the highest level of summarization of financial performance. Moreover, given that the influence of display probably increases with the level of summarization users rely on, the issue of duality at the EPS level, the highest level of summarization, is relatively most relevant. Duality of display at the level of the EPS number implies mandatory publication of two EPS numbers, one for historical cost net income and one for comprehensive income.

Obviously, the answer to the question of whether dual income display at the highest level of summarization is indeed a desirable standard setting objective ultimately depends on the absence of persuasive arguments for valuation purposes to rely exclusively on comprehensive income or on net income, presuming that users either only acquire information about the EPS number(s) or attach too much weight to it. In the absence of such arguments, sole reliance on a single income number is not warranted and financial reports should possibly reflect the duality of the income measurement model by reporting two EPS numbers.

Traditionally, arguments in favour of one income concept have tended to sway with one's view on the use of the income number for valuation purposes. Those interpreting investor relevance as accounting for equity have regarded income as the temporal elaboration of the equity account and have argued in favour of comprehensive income since this shows the total increase in the value of net assets. However, this article analyses several 'true income' notions that have figured in accounting theory. It finds that these do not provide *a priori* arguments to consider comprehensive income to the exclusion of net income. On the other hand, those attaching greater importance to predictive ability of income favour net income because of its superior analytical properties *vis-à-vis* comprehensive income. Proponents of net income could borrow support from the informational approach in accounting research and, contrary to what is commonly believed in the literature, also from the valuation approach, which was advanced by Ohlson. This article argues that the exclusion of transitory fair value income components, which is proposed by this research, is based on an incomplete notion of prediction and that there could be benefits from considering comprehensive income in addition to net income for the purposes of prediction.

Regardless of the purpose of the income number one envisages, no case for exclusive focus on a single concept of income can be made. Hence this article argues that a dual approach, putting two income and EPS numbers on an equal standing, should be considered. However, several possible effects on perception and actual use of financial reports from publishing two EPS numbers are imaginable. Since these should be considered before implementing a double EPS display, they are suggested as topics for experimental research.

THE IASB COMPREHENSIVE INCOME PROJECT

Both the IASB and the FASB are currently involved in a performance reporting project. Until recently, the IASB and the FASB conducted these projects separately. As of 2004, the Boards agreed, in the interest of international convergence, to conduct a joint project on this topic and established a new Joint International Working Group on Performance Reporting to assist them (IASB, 2004a). The objective of the performance reporting project is to establish standards for the presentation of information in the financial statements that would improve the usefulness of that information in assessing the financial performance of a business enterprise (IASB, 2005b). The reporting requirements of financial institutions will be considered separately and are for the moment not included in this project (IASB, 2005b), one of the main goals of which is to create a comprehensive income statement that will categorize and display all components of income. In other words, the key issues revolve around the content and appropriate display of income. Standard setters' focus on investor decision relevance, combined with the prominence of the income number to the investing community, make income one of the most central outputs of the accounting model. Hence the importance of this project can hardly be overstated. Frankly, given the high status of the income notion, it may seem surprising that its determination and presentation still remain to be settled by the world's two main accounting bodies.

While it is explicitly mentioned that the project deals only with presentation and will not address issues of measurement and recognition (IASB, 2003), there is nonetheless a strong link in the sense that measurement and recognition directly determine the properties of the income number. It is exactly the inability to settle between the historical cost and fair value measurement paradigms that finds its way into present day discussions concerning the income statement. One of the main questions to be solved concerns whether or not remeasurements, resulting from fair value accounting, should be included in income and if so, how these should be presented therein. In principle, under the IASB Framework, both revenue and gains are included in income, and expenses also include losses (IASC, 1989). So, in principle, the IASB Framework endorses 'clean surplus' accounting, under which every income and expense item is run through the income statement. As a consequence of double-entry accounting, the clean surplus income number shows the increase in net assets derived from non-owner transactions and is therefore regarded to be a 'true' or 'tell it like it is' measure of income. In practice, however, many individual IASB standards, especially those involving fair value measurement, have departed from the clean surplus rule. A few examples are IAS 16, *Revaluation of Property, Plant and Equipment*; IAS 21, *Foreign Exchange Gains/ Losses on Translation of Net Investment*; and IAS 39, *Unrealized Gains/Losses on Available for Sale Instruments*. In recent debates fair value measurement has met with serious opposition from historical cost adherents, especially from the preparers' side (Walsh, 1996). Higher income volatility, due to the inclusion of fair value remeasurements, raised the fear for higher risk premiums (American Bankers Association, 1990; Hirst *et al.*, 2004).[1] Further, the subjective character of certain fair value measurements was said to corrupt the quality of the income number (Barth, 1994; Bernard *et al.*, 1995; Joint International Working Group on Performance Reporting, 2005). Under dirty surplus accounting, fair value remeasurements are not recorded in the income number, but are 'bypassed' directly to equity. It is well known that this practice reflects a compromise, allowing fair value measurement of balance sheet items to progress, while retaining the traditional properties of the income number (Johnson *et al.*, 1995). Obviously, the disadvantage of this procedure for fair value proponents was that fair value accounting was to a large extent removed from the income statement. Depending on the views on the hypothesis of market efficiency one entertains, this can constitute a serious impediment to enhancing fair value relevance. Obviously, if markets are efficient, then it does not matter where information is presented because prices will impound all available information anyhow. However, if one relaxes one's views of market efficiency and considers the (undue) attention that the income concept receives in financial markets, one might entertain the idea that fair value has not been given a fair chance. From a standard setter's point of view, bypassing fair value remeasurements constitutes a negation of its own measurement model. From a user's point of view, to the extent that fair value measures are indeed relevant for valuation purposes, the more items are taken directly to equity, the more the equity account will become a dumpster for an amorphous and growing mass of important information (Beresford *et al.*, 1996). The demand for comprehensive income reporting by the Association for Investment Management and Research (AIMR, 1993) voiced this concern. Comprehensive income is the change in the value of net assets during a period from all sources except for transactions with owners (Robinson, 1991). So even under dirty surplus accounting, comprehensive income reconciles all income and expense items, regardless of whether these were booked directly on the equity account or passed through the net income statement. In other words, a statement of comprehensive income mimics clean surplus income. To have all gains and losses reported in an organized way in a statement of comprehensive income would enhance the accessibility and comprehensibility of financial statements (AIMR, 1993). In response to these concerns, standard setters' intentions to report comprehensive income gained momentum. Since 1997, SFAS 130, *Reporting Comprehensive Income* (FASB, 1997), requires the reporting of comprehensive income in a financial statement with the same prominence as the other statements that together constitute a full set of financial statements. IAS 1, *Presentation of Financial Statements*, permits but does not require a single comprehensive income statement.

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[1] In the 1960s and 1970s such debates had appeared—see, for example, Gynther (1971) and Chambers (1972)—and they resurfaced when CPP and CCA inflationary supplementary statements were proposed in the late 1970s.

With the joint performance reporting project, the Boards have taken their intention to advance the comprehensive income concept one step further. By December 2005, tentative conclusions reached in the project indicate that a comprehensive income statement, which would replace the current income statement, is the ultimate goal of the performance reporting project for both the IASB and the FASB (IASB, 2005b). This statement is currently referred to in the project as the *statement of recognized income and expense*, but preparers would be allowed to choose their own titles and labels for totals and subtotals (IASB, 2005b). The statement would include a subtotal *profit or loss for the period.* While the initial intention of the IASB was to require a single statement, an alternative that consists of presentation of comprehensive income in two statements was allowed. An income statement would thereby show profit or loss for the period, while the statement of recognized income and expense would begin with profit or loss for the period and display all other comprehensive income components. Although the Board expressed its preference for a single statement approach and found no conceptual base for presentation in two statements, it allowed for this alternative because of the resistance that seemed to be prevalent among constituencies about the move to a single statement of recognized income and expense (IASB, 2005a).

Obviously, the meaning of the profit or loss subtotal will depend on the categorization scheme that will apply. This issue is expected to be decided in a second phase of the project (IASB, 2005b). However, a categorization that has already been discussed in the course of the project (Joint International Working Group on Performance Reporting, 2005) and that has gained considerable academic interest (Newberry, 2003; Barker, 2004) is based on the division between historical cost accounting income and fair value remeasurements. The subtotal profit and loss for the period would then be based on accrual-based historical cost accounting (i.e., excluding fair value remeasurements) while the total comprehensive income would include fair value remeasurements.

A project that would incorporate all fair value gains and losses in an income statement and that advances comprehensive income as the ultimate income total can be expected to increase the prominence of display of fair value income components. According to Lipe (1998), items in the income statement receive higher processing and judging weight just because they are part of an income statement.

Another possible indication of the re-evaluation of comprehensive income concerns the matter of recycling. Although this issue will be decided in a later stage of the project (IASB, 2005b), tentative conclusions indicate that recycling will be prohibited (IASB, 2004b). Preventing recycling implicitly obliges users to consider fair value remeasurements in their analysis. Recycling of an item of financial performance refers to reporting of that item in more than one accounting period because the nature of the item is deemed to have changed in some way over time (G4+1, 1999). For example, unrealized gains, which have been reported in the comprehensive income statement under remeasurements, are, in a later period, when realization occurs, again reported as income, but this time under the subtotal profit or loss for the period. The motivation for recycling is the concern that early recognition of fair value measurement pre-empts the point of realization as a recognition signal. Therefore, certain income items, which users may potentially regard as value relevant, will never pass through profit or loss for the period if the latter is made devoid from fair value remeasurements, as would be the case under the suggested comprehensive income categorization. A prohibition on recycling is motivated by the IASB's preference that income components should only be recorded once. However, users who rely exclusively on profit or loss for the period will miss these income components completely if they are not recycled and are therefore obliged to consider comprehensive income. Although the magnitude of this problem obviously depends on the specifics of the economic activity and on the extent of fair value accounting, a prohibition on recycling no doubt constitutes a re-evaluation of comprehensive income and of fair value accounting in general.

Finally, the calculation and display of the EPS number could also influence the status of display of fair value remeasurements *vis-à-vis* historical cost income components. IAS 1, *Presentation of Financial Statements*, requires only the presentation of net income as a base for EPS calculations while revisions to IAS 33, *Earnings per Share*, preclude alternative income numbers for this purpose. But as the comprehensive income project is obviously geared towards dual income presentation, the introduction of two EPS numbers, one for profit or loss for the period and one for comprehensive income, seems a straightforward suggestion. Given the importance and visibility of the EPS number in investment practice, the importance of this issue should not be underestimated. The Boards have included the analysis of comprehensive income per share calculation and display in their performance reporting project, but will address the issue in a later stage (IASB, 2005b).

Thus, the analysis of the performance reporting project shows that the IASB and the FASB are moving towards a model which gives prominence to two income concepts, profit or loss and comprehensive income. If two EPS numbers were to be required on the income statement, then this duality would also be reflected at the level of per share income reporting. The aim for the rest of this article is to investigate whether a case can be made to support such an evolution. With this in mind, the next section analyses several income notions from accounting theory.

PRO COMPREHENSIVE INCOME: TRUE INCOME SCHOOLS

The period before 1968, that is, before the papers of Beaver (1968) and Ball and Brown (1968), heralded empirical accounting research, witnessed several attempts by economists to harmonize the traditional accounting concept of income with economic thinking (Beaver *et al.*, 1968; Revsine, 1973, pp. 28–56; Beaver, 1998, pp. 3–4). These theories were labelled 'normative' because, although they differed strongly in their conclusions, they all applied economic reasoning to develop income notions that possess characteristics that income 'ought' to have. These normative writers were blamed for the fact that, to develop their theories, they needed to make assumptions about the information needs of users and how these information needs were best served. So basically, the validity of a proposed income concept depended on these assumptions. With the rise of empirical accounting research, the work of these normative thinkers soon grew out of vogue (Watts, 1995). These days, for some, it has become unfashionable to rely on normative accounting theories. However, according to others, it could be beneficial to reconsider this work because the strong conceptual foundations still bear upon present day discussions (Demski *et al.*, 2002; Newberry, 2003).

Yet, in spite of the rigorous investigation of the income concept that was undertaken in those days, the issue of whether it should be defined comprehensively or not was treated only tangentially and one has to read carefully to find clues on this subject.

The two polar notions are historical cost accounting income and economic income. According to Hicks, income is defined as 'the maximum value which a man can consume during a week and still be expected to be as well off at the end of the week as he was in the beginning' (Hicks, 1946, pp. 171–81). For an enterprise, this corresponds to the maximum amount of dividends that can be distributed while retaining the same value of net assets as in the beginning of the period. The important aspect of this definition lies in the explicit recognition of the intertemporal nature of income: Aside from owner-related transactions, income emerges only after the value of net assets has been maintained for the next period. On the other hand, apart from owner-related transactions, once the value of net assets has been maintained, *all* value changes above or below that level are considered as income. This point holds irrespective of the actual valuation system that applies. However, this is the very definition of clean surplus accounting. In other words, starting from the Hicksian definition of income, clean surplus income is self-evident. Basically, this is the rationale behind the defence of proponents of clean surplus accounting.

However, this equality is only definitional since nothing has been said about how 'well off', or the value of the assets and liabilities, is to be measured. Once a specific valuation measure is applied, it no longer is evident that all changes in the value of net assets can automatically be considered as income. Consider the economist who calculates economic income in a forward-looking manner by valuing assets and liabilities at the discounted present value of their future cash flows. In reality, these cash flows are uncertain and will have to be approximated by using current market prices or estimates. Hence, due to unravelling of uncertainty between balance sheet dates, the most recent balance sheet value always has an *ex post* character towards the previous balance sheet. Since the most recent balance sheet always contains the possibility of a partial revision of the estimates of the previous balance sheet data, part of economic income may be caused by errors due to uncertainty in the estimation of the opening balance sheet at that time. If economic income is defined as the increase of the 'revised' value of net assets, it may not be viewed as income of the current period at all, but rather as capital readjustment (Lee, 1985, pp. 33–9). So, due to uncertainty, the answer to the question of whether income should be defined comprehensively cannot be derived *a priori* from an economic definition of income and depends on one's view of whether the original or revised value of net assets should be maintained.

In the historical cost accounting model, the problem of uncertainty is avoided by the fact that balance sheet items are initially booked at historical transaction price (which is certain) and recognition of gains or losses is delayed until uncertainty about their current value is resolved by the event of realization. However, under historical cost accounting, the inter-temporal allocation of income may be completely distorted. This is exactly one of the main critiques against the historical cost model. Because of its adherence to the realization principle, which disregards the timing of when certain income components accrued, historical cost accounting income may include components that do not belong to the reporting period. Therefore, historical cost accounting income reports are typically subdivided and income components that do not belong to the current period are relegated to a subgroup of extraordinary items, which is reported below the line of normal or recurring income. This below-the-line reporting can be considered as *ad hoc* dirty surplus accounting since attention is normally devoted to the items above the line. However, because items reported below the line are definitely realized, definitely contributed to wealth and can therefore be considered as distributable to the owners, it is not *a priori* clear which income notion should be viewed as the increase in the value of net assets of a certain period.

The economic and historical cost accounting definitions of income constitute two extremes. A variant of the business income concept, that of Edwards and Bell (1961), combined the advantages of these two approaches. Its point of departure is historical transaction-based registration, but at the end of the accounting period an adjustment is made to reflect current entry prices. Entry prices are the prices that an enterprise would have to pay to replace its assets. The business income model shares with the economic income model that it does not await realization to register changes in the value of assets and liabilities. But because records of historical transactions are kept in the business income model, more information is available than under a pure balance sheet approach, and a distinction between operating income and holding gains is possible. Operating income is the difference between the value of the output and the current entry value of the assets that were used in the process. Holding gains represent the change between balance sheet dates in the entry value of the assets.

A controversial issue concerns whether or not holding gains and losses should be classified as income according to the model of business income. According to Edwards and Bell, a holding gain represents a benefit to a firm and, for the purpose of reporting wealth accrue to shareholders, should be included in income. 'A holding gain represents a cost saving due to the fact that inputs were acquired in advance of use' (Edwards and Bell, 1961, p. 93). However, according to Revsine (1973), a firm does not benefit from a holding gain since the use of replacement costs corresponds to a model of physical capital maintenance. Consequently, holding gains must be retained in the enterprise to allow for the maintenance of physical capital. Holding gains do not contribute to profit at all and have to be carried to the balance sheet as an adjustment to equity. However, for the purpose of reporting wealth accruing to shareholders, Edwards and Bell seem to abandon the concept of physical capital maintenance: 'The existence of the gain is not to be confused with the disposal of the gain. The gain exists and has been realized. That the firm chooses to purchase identical merchandise is to select one of several alternatives' (1961, p. 118). But according to Revsine, 'if the cost saving is included in income, it is because it represents an opportunity gain accruing to the firm because it purchased its assets when it did rather than at a later date. Incorporating such opportunity costs into an accounting system introduces troublesome issues. Theoretically, there are an unlimited number of possible courses of actions available to a firm. Selecting one such conceivable event for juxtaposition with actual events is difficult to defend' (Revsine, 1973, pp. 88–89).

Edwards and Bell did not go to great lengths to defend the inclusion of holding gains in income. Rather, their focus was on the separation of total income to reflect the division between operating and holding activities. 'The natures of these two types of activity and the decisions involved are so different that their separation is vital for decision making' (1961, p. 36). In their view, operating profit is of greater significance for most firms and is the most relevant concept for evaluating management. The main benefit of using replacement costs is that operating profit indicates whether or not the current proceeds from the sale of products are sufficient to cover the current cost of the factors of production used in producing that output. Operating profit is therefore 'a concept of profit which measures truly and realistically the extent to which past decisions have been right or wrong' (1961, p. 25).

Related to the business income model is the realizable income model (Chambers, 1966; Sterling, 1970). Instead of using replacement costs, the realizable income notion is based on the opportunity cost or money that the enterprise is sacrificing by having the assets in the company. Hence, realizable income measures how the value of the assets has changed using exit prices, rather than entry prices. Like business income, it also consists of two components: (a) realized income, which measures the difference between the value of the outputs sold and the value of the inputs measured at current exit prices, and (b) unrealized gains, which represent the difference in exit value of the assets between the beginning and the end of a period. The answer to the question of whether unrealized gains are income is more straightforward in the realizable income model. As the value of the assets is measured in money terms, the realizable income model envisages a nominal notion of capital. In other words, unrealized gains are part of income and can be distributed without decreasing the nominal value of net assets. However, in practice, for some assets, liquid markets do not exist so that direct exit prices are unavailable and estimates of exit prices are potentially unreliable. In these cases, the degree of uncertainty involved could be such that it may be unwarranted to consider value increases as income.

Reconsidering the current performance reporting project and the proposals for categorizing comprehensive income that are developed therein, there is a remarkable resemblance between these proposals on the one hand, and the business income and the realizable income models on the other. All these models have in common that they advance a dual income display and defend a separation between two different income concepts that is based on economically meaningful criteria. In general, the gains and losses component in these models is viewed as less relevant for management evaluation and prediction purposes.

To conclude this section: At first sight, the analysis of the different concepts of income that figure in accounting theory seems a promising avenue to solve the issue of whether income should be defined comprehensively. In principle, the concept of capital maintenance provides an unambiguous reference point by which profit can be measured: Value changes above the level that is needed to maintain the value of net asset are defined as profit. In practice, however, this analysis does not allow for unambiguous conclusions. Physical capital maintenance implies the use of replacement cost as a basis for measurement. Increases in entry prices show how much a company needs to put aside to replace its assets. Therefore, as pointed out by Revsine, it is problematic to consider gains and losses as profit under this model. However, considering IASB and FASB accounting, the current debates between net income versus comprehensive income proponents revolve mainly around fair value remeasurements (Barker, 2004). Obviously, the latter refer to a model of nominal capital maintenance (Newberry, 2003). Therefore, the guidance that the concepts of replacement and physical capital maintenance have to offer for this discussion seems limited. According to the concept of nominal capital maintenance, gains and losses should be included in income. Historical cost accounting considers the money amount that was originally invested in the company as the value concept that is to be maintained and recognizes a change in this amount only when gains and losses have been realized. But since realized gains and losses may refer to price changes of previous periods, it may be intuitively difficult to consider them as income of the period in which realization occurred. The realizable income model regards the current exit value of net assets as the value concept to be maintained and considers gains and losses measured by changes in exit prices as part of income. However, in practice, it is possible that the unreliability of exit prices or their estimations may raise doubt with regard to their inclusion in income. The same concern applies to the calculation of net present values, which serves as a measurement basis for the economic balance sheet approach to income determination.

PRO NET INCOME: INFORMATIONAL AND VALUATION ACCOUNTING RESEARCH

Informational Accounting Research

The inability of the normative schools to reach consensus on the 'best' method of income determination caused, in the late 1960s, a shift in focus of accounting research to an 'informational' approach (Beaver, 1998). Compared to normative models, informational accounting research does not rely on arbitrary assumptions regarding user decision models (Beaver *et al.*, 1968). Instead, starting from the dividend discount model, it relies only on the hypothesis of market efficiency to assume that all available information regarding future dividends is reflected in share prices. Hence market data were used as a benchmark against which to judge accounting alternatives. In these 'association studies', the higher the earnings response coefficients, which measure the covariation between an accounting income number and a market value metric, the more information relevant the income number was supposed to be. Although early research in this area indicated that there was indeed information content in accounting income numbers (Ball and Brown, 1968), generally the magnitude of the earnings response coefficients and associated R-squareds was considered as surprisingly low (Lev, 1989). The presence of transitory income components was soon advanced as a possible explanation. Transitory income components make current accounting income a poorer proxy for future expected income. In other words, if changes in accounting income are deemed less persistent, they will elicit lower market response. While Miller and Rock (1985) formally demonstrated this explanation, papers by Kormendi and Lipe (1987), Easton and Zmijewski (1989) and Ali and Zarowin (1992) empirically confirmed the existence of downward bias in estimating earnings response coefficients of transitory income components. Accordingly, this line of research provided a motivation to depart from clean surplus accounting.

Valuation Approach: The Ohlson Model

In turn, the informational approach to accounting research was also challenged. Holthausen and Watts (2001) warned against drawing standard setting inferences from association studies. According to them, the lack of an underlying theoretical framework makes the conclusions of association studies *ad hoc*. Another concern was that, although associations between accounting and market data were investigated, the assumption of market efficiency made association studies useless for valuation purposes (Penman, 1992). The Ohlson model (Ohlson, 1995; Feltham and Ohlson, 1995) addressed many of these problems and is broadly recognized as one of the main theoretical contributions to accounting research (Bernard, 1995; Lundholm, 1995; Dechow *et al.*, 1999; Lo and Lys, 2000; Penman, 2005). Ohlson directed attention back to valuation by reconsidering the residual income relation. This relation, which originally dates back to earlier work of Preinreich (1936), Edwards and Bell (1961), Kay (1976) and Peasnell (1982), provides a direct link between firm value and accounting data, relying thereby only on clean surplus accounting. The EVA™ valuation model (Stewart, 1991) is a well-known application of this residual income equation. The importance of the Ohlson model and its emphasis on clean surplus accounting also drew the attention of advocates of comprehensive income (Brief and Peasnell, 1996). However, in many ways the clean surplus assumption is not as essential to the Ohlson model as is generally assumed. In fact, Ohlson (1999) discriminates between persistent and transitory income, departs explicitly from clean surplus accounting and comprehensive income reporting. Because of its importance, the model is presented briefly below.*

The starting point of the model is the dividend discounting equation, according to which the equilibrium total stock market value of the firm will equal the present value of future expected dividends:

$$P_t = \sum_{\tau=1}^{\infty} \frac{E_t[d_{t+\tau}]}{(1+r)^{\tau}}. \tag{1}$$

P_t, the total stock market value of the firm, is calculated by multiplying the number of shares with the market share price at time t. As indicated by Ohlson (2005), equilibrium condition (1) initially applies to the per share level. However, under the assumption that the number of shares will remain constant throughout the forecast horizon, multiplying both sides of the equation with the number of shares is only a matter of scaling. d_t represents net dividends paid. The word net means that potential capital contributions to the company by the owners are deducted from dividends. The risk free interest rate r is assumed to be constant over time. The use of the risk free interest rate reflects the assumption that investors are risk neutral. This assumption is made for reasons of simplicity and can be relaxed without major consequences (Feltham and Ohlson, 1999). E_t reflects the investors' expectations, conditioned on the information set available at date t. Equilibrium condition (1) assumes that these expectations are homogenous among investors. Next, clean surplus accounting is assumed:

$$b_t - b_{t-1} = x_t - d_t, \tag{2}$$

where b_t equals the book value of net assets at time t and x_t equals total income for the period $(t-1, t)$. The clean surplus relation states that all changes in the book value of net assets $(b_t - b_{t-1})$ unrelated to net dividends (d_t) must pass through income (x_t). In other words, the clean surplus equation defines income to be all-inclusive (comprehensive). Further, it is assumed that $\partial b_t/\partial d_t = -1$ (dividends reduce book value unit for unit) and that $\partial x_t/\partial d_t = 0$ (dividends have no effect on current income). The clean surplus equation can be rearranged as

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* *Editor's note*: This article was accepted before publication of Isidro *et al.* (2006), which provides an extensive demonstration of the model.

$$d_t = b_{t-1} + x_t - b_t, \tag{2'}$$

which can be used to replace dividends in equation (1):

$$P_t = \sum_{\tau=1}^{\infty} \frac{E_t[b_{t+\tau-1} + x_{t+\tau} - b_{t+\tau}]}{(1+r)^{\tau}}, \tag{3}$$

In other words, using the clean surplus relation, the dividend discounting equilibrium condition has been transformed into an equation that defines the total share value of the company in terms of accounting variables, to wit book values and accounting income. Equation (3) is equivalent to

$$P_t = \frac{E_t[b_t + x_{t+1} - b_{t+1}]}{1+r} + \frac{E_t[b_{t+1} + x_{t+2} - b_{t+2}]}{(1+r)^2} + \frac{E_t[b_{t+2} + x_{t+3} - b_{t+3}]}{(1+r)^3} + \dots,$$

and, after some rearranging,

$$P_t = b_t + \frac{E_t[x_{t+1} - rb_t]}{1+r} + \frac{E_t[-(1+r)b_{t+1} + b_{t+1} + x_{t+2}]}{(1+r)^2} + \frac{E_t[-(1+r)b_{t+2} + b_{t+2} + x_{t+3}]}{(1+r)^3} \dots$$

Deleting opposite terms and invoking the summation operator yields:

$$P_t = b_t + \sum_{\tau=1}^{\infty} \frac{E_t[x_{t+\tau} - r.b_{t+\tau-1}]}{(1+r)^{\tau}} - \frac{E_t[b_{t+\infty}]}{(1+r)^{\infty}}, \tag{4}$$

The expectations limit of discounted book value is assumed to approach zero at infinity so that the last term drops out of the equation. The next step is to define 'residual' or 'abnormal' income as

$$x_t^a = x_t - r.b_{t-1}. \tag{5}$$

In other words, residual income is calculated by deducting a charge from income for the use of capital. This capital charge is measured by beginning of period book value of net assets multiplied by the cost of capital. Accordingly then, equation (4) can be expressed as:

$$P_t = b_t + \sum_{\tau=1}^{\infty} \frac{E_t[x_{t+\tau}^a]}{(1+r)^{\tau}}. \tag{6}$$

Equation (6) is the well-known residual income valuation (RIV) model. It equals the market value of the company shares to the book value of net assets plus the present value of expected residual income. It demonstrates that, if the clean surplus relation holds, the dividend discounting equation can be transformed into an equation defined only in terms of accounting variables. It is important to recognize that the RIV model depends in no way on the properties of the accounting model other than the clean surplus relation. If, for instance, accounting is economic value accounting, all assets and liabilities will be recorded at net present value. In principle then, the book value of net assets will equal the market value of the shares and expected future residual income will be zero. Obviously, when markets are imperfect or incomplete or when there is uncertainty, this equality will never hold exactly (Beaver, 1998). If accounting is more conservative, this will simply drive down book value at time t and drive up subsequent residual income estimations (O'Hanlon and Peasnell, 1998). Residual income in fact bears on the difference between the economic values of assets and liabilities and their recorded book values. Because the RIV model incorporates residual income until infinity, all value that is expected to be created throughout the future of the company has to show up in current book value or expected future residual income eventually, regardless of the underlying accounting model. Book value and expected future residual income act as complementary value indicators (Ohlson, 1995). The role of the clean surplus relation is to make this complementarity watertight by assuring that, apart from owner-related transactions, no value creation can escape from the residual income series.

However, the analytical properties that follow from the clean surplus 'relation' do not necessarily require clean surplus 'accounting'. First, to derive the RIV relation, clean surplus *accounting* as such is not a necessary condition. Dirty surplus accounting means that certain changes in the value of net assets bypass the income statement and are booked directly to equity. It can easily be shown that under dirty surplus accounting, the RIV relation can be derived as well. The only additional condition is that the amount of income that bypasses the income statement is introduced as a new variable into the model. Suppose that this variable is labelled s_t. For example, s_t could contain unrealized gains/losses on available for sale financial instruments which, according to IAS 39, have to be booked directly to equity. Defining x_t^d as dirty surplus income, or that part of income which is not bypassed and actually is recorded as income, allows one to write the following identity:

$$b_t - b_{t-1} = x_t^d + s_t - d_t, \qquad (2'')$$

which one could label the dirty surplus equivalent of equation (2). Obviously, if s_t is known, comprehensive income can be calculated by adding all sources of income, irrespective of whether they were bypassed (s_t) or recorded as income (x_t^d). Hence, one can write that $x_t^c = x_t^d + s_t$, where x_t^c is comprehensive income. From the definition of x_t^d and s_t, it is obvious that $x_t^c = x_t$. In other words, comprehensive income is nothing more than a reconciliation of recorded dirty surplus income (x_t^d) with bypassed income (s_t) and in fact mimics clean surplus income x_t. This means that, in the so-called dirty surplus equation (2″), $x_t^d + s_t$ can be replaced by x_t^c, which is equal to clean surplus income x_t. Therefore, equation (2″) is identical to equation (2) and, starting from equation (1), the residual income equation (6) can be derived in exactly the same way as under clean surplus accounting. While the demonstration of this point is trivial, it clearly shows that, even with dirty surplus accounting, the residual income relation can be derived.

The only necessary condition is that the analytical model is enriched with a new variable s_t, which provides the information to calculate comprehensive income, thereby picking up the items that bypassed the income statement. In other words, in the Ohlson model, the emphasis on clean surplus *accounting* to derive the clean surplus *relation* is self-inflicted by the deliberate restriction of the model in terms of three accounting variables: dividends, recorded income and book value of net assets. Under those conditions, income that bypasses the income statement is not observed and cannot be inferred if dividends are replaced in equation (1). The same point applies to the earlier papers that emphasized clean surplus as a necessary condition to derive other algebraic properties of accounting data (Edwards and Bell, 1961; Brief and Lawson, 1992). The consequence for empirical research applications is that the Ohlson model can be applied even in a dirty surplus environment (e.g., U.S. GAAP, IAS/IFRS GAAP), provided that researchers are able to restate earnings in terms of comprehensive income (Lo and Lys, 2000).

Also, in valuation exercises, dirty surplus accounting poses no problems since it suffices that analysts form their earnings expectations in terms of clean surplus income, so that future book value changes are predicted to be faithful to the clean surplus relation (Bernard, 1995).

In other words, and contrary to common belief, provided that bypassed income is available and can be included in the analysis, clean surplus accounting as such is unnecessary to calculate comprehensive income and derive and apply the RIV model.

In a critical review of his previous work, Ohlson (2005) departs from the RIV model. He starts out by pointing at a conceptual flaw in the derivation of the RIV equation. It was mentioned earlier that excluding future equity transactions that change the number of shares outstanding allows one to write the equilibrium dividend discounting relation (1) on a per share level or on a total equity level. However, as explained by Ohlson (2005), when one takes into account the more realistic case that future equity transactions might change the number of shares outstanding, equilibrium condition (1) applies only to a per share level and not to a total equity level. Consequently, the derivation of the RIV equation can only be made on a per share level and therefore has to rely on the clean surplus relation on a per share level. However, equity transactions that change the number of shares outstanding generally imply that the clean surplus relation cannot hold on a per share level. In other words, changes in the number of shares outstanding generally imply that $\Delta bps \neq xps - dps$, where Δbps indicates the change in book value per share and xps and dps represent income and dividends per share, respectively. The reason is that, unless new shares are issued at the book value per share (bps), a condition which is rarely satisfied, changes in the number of shares generally imply that the book value per share bps changes for reasons that are unrelated to xps (the source of value creation) and dps (the distribution of value through dividends). This impossibility of the clean surplus relation on a per share level does not rest on dirty surplus accounting. Even with clean surplus accounting, the clean surplus relation on a per share level cannot hold because the difference between the issuance price of new shares and the book value per share causes changes to bps. In the light of this unsatisfactory aspect, Ohlson (2005) proposes an alternative to RIV. This new approach is developed in Ohlson (2005) and Ohlson and Juettner-Nauroth (2005) and applies to a per share level. It no longer relies on the clean surplus relation and replaces book value per share in RIV with capitalized expected next-period earnings per share. The exact formula that is derived equals the market share price to next period expected earnings per share capitalized plus the present value of the expected future abnormal earnings growth. This formulation is referred to as the abnormal earnings growth model (AEG). According to Ohlson (2005), the replacement of book value with discounted future earnings better captures market value and accords better with investment practice, which emphasizes expected earnings as a core value attribute and does not attach such a role to book values.

Since the derivation of the AEG model does not rely on clean surplus accounting, discounted earnings could apply to comprehensive accounting income, dirty surplus accounting income or even to popular user-defined income numbers like for instance earnings before interest, tax, depreciation and amortization (EBITDA). Ohlson (2005) Ohlson and Juettner-Nauroth (2005) therefore take no normative stance with regard to clean or dirty surplus accounting. To be sure, these papers demonstrate that an accounting-based valuation model can be built without clean surplus accounting, but the only reason that the AEG model does not rely on the clean surplus relation is to circumvent the technical difficulties that are created by the issuance of new shares. These papers do not build a case against clean surplus accounting as such. Penman (2005) points out that, even after considering the AEG model, RIV and comprehensive income still have a role to play since they invoke discipline in the accounting system, allowing no value creation to escape from the income series.

However, in an earlier paper on transitory income components, Ohlson (1999) does take a normative stance and advocates a departure from both clean surplus accounting and comprehensive income reporting. Before demonstrating this point, it is worthwhile to reconsider the RIV equation (6) for a moment. This equation requires the prediction of future book values. Otherwise the capital charges on future book values cannot be predicted and future residual income cannot be forecast. However, one cannot predict future book values without predicting future dividends since these determine, together with earnings and the book value of the previous period, future book values. But if one needs to predict dividends, one might just as well use the dividend discounting equation (1), which would mean that the estimations of earnings and book values are redundant. In fact, this conclusion is obvious since the residual income model is nothing more than a restatement, through the clean surplus relation, of the discounted dividend formula (Ohlson, 1995; Dechow, 1999). The problem with predicting dividends to establish the value of the firm is known as the dividend conundrum: Unless the series of observed or predicted dividends includes the final liquidating dividend, this dividend series is arbitrary and tells nothing about the value of the firm (Penman, 1992). Equation (6) does not solve this problem.

As a way out of this difficulty, and this is the true innovation of the Ohlson model, Ohlson (1995) imposed an autoregressive pattern on abnormal earnings.

This autoregressive pattern means that future abnormal earnings are forecast using current abnormal earnings, which relieves the model of the need to predict future book values and dividends. We demonstrate the advantages of this approach by considering Ohlson (1999), which builds on this autoregressive model to elaborate on the difference between core and transitory earnings. The ensuing analysis provides arguments to depart from clean surplus accounting and focus on net earnings.

Ohlson (1999) separates total earnings x_t into x_{1t}, earnings that are included in the income statement, and x_{2t}, earnings that bypass the income statement:

$$x_t = x_{1t} + x_{2t}. \tag{7}$$

Since obviously dirty surplus applies, one can again think of x_t as reconciled comprehensive income, meaning that the clean surplus relation (2) applies to x_t. Next, the autoregressive earnings process is introduced as:

$$x^a_{t+1} = \omega_{11}x^a_t + \omega_{12}x_{2t} + \varepsilon_{1,t+1}, \tag{8a}$$

$$x_{2t+1} = \omega_{22}x_{2t} + \varepsilon_{2t+1}, \tag{8b}$$

where ω_{12} and ω_{22} are persistence parameters and the ε's are unpredictable zero-mean disturbance terms.

Equation (8a) forecasts future total residual earnings out of current total residual earnings ($x^a_{t+1} = \omega_{11}x^a_t$). The inclusion of $\omega_{12}x_{2t}$ in equation (8a) extends the model with the technical possibility to eliminate x_{2t} from the prediction of total residual earnings. The latter can be demonstrated by setting $\omega_{11} + \omega_{12} = 0$. Using the definition of abnormal earnings (5) and the definition of total earnings (7), equation (8a) can be transformed into:

$$x^a_{t+1} = \omega_{11}(x_{1t} + x_{2t} - rb_{t-1}) + \omega_{12}x_{2t} + \varepsilon_{1,t+1}, \tag{8a$'$}$$

assuming that $\omega_{11} + \omega_{12} = 0$ causes x_{2t} to drop out of the equation and is equivalent to proposing that x_{2t} is not relevant for forecasting next-period total residual earnings.

Equation 8b models the prediction of x_{2t+1} as a function of its own current value x_{2t}. Assuming that ω_{22} is equal to zero is saying that x_2 does not predict itself.

After some algebra, equations (8a) and (8b) allow the residual income relation (6) to be re-written as

$$P_t = b_t + \alpha_1 x^a_t + \alpha_2 x_{2t}, \tag{9}$$

with $\alpha_1 = \omega_{11}/(1 + r - \omega_{11})$ and $\alpha_2 = \omega_{12}(1 + r)/[(1 + r - \omega_{11})(1 + r - \omega_{22})]$.

As is clear from equation (9), the imposition of an autoregressive pattern on earnings liberates the residual income model from the prediction of future earnings and hence from the estimation of future dividends. In this way, the dividend irrelevancy problem is solved. The value of the firm can be derived in terms of current book value and current comprehensive and bypassed income.

Ohlson (1999) then provides a definition of transitory earnings in terms of two conditions: (a) transitory earnings do not predict themselves, and (b) transitory earnings do not forecast other earnings components. Now, considering the autoregressive earnings process (8a) and (8b), if the definition of transitory earnings were to apply to the income components that bypass the income statement (x_2), this would imply that $\omega_{22} = 0$ and that $\omega_{11} + \omega_{12} = 0$.

Considering equation (8b), the implication that ω_{22} should equal zero follows directly from condition (a) that states that transitory earnings should not predict themselves. The derivation of the condition that $\omega_{11} + \omega_{12} = 0$ requires somewhat more careful thought. Condition (b) requires that transitory earnings, in this case x_2, do not predict other earnings, in this case x_1. But condition (a) already states that x_2 does not predict future x_2. So together, conditions (a) and (b) imply that x_2 does not predict x_1 and does not predict x_2. Obviously then, x_2 does not predict total earnings x. It was previously demonstrated that this last property corresponds to the condition that $\omega_{11} + \omega_{12} = 0$.

But if $\omega_{22} = 0$ and $\omega_{11} + \omega_{12} = 0$, then it follows directly from the definition of $\alpha_1$and α_2 that $\alpha_1 + \alpha_2 = 0$ which means that transitory earnings x_{2t} drop out of the valuation equation (9):

$$P_t = b_t + \alpha_1 x_{1t}^a \tag{10}$$

In other words, if the x_2 earnings series is transitory, then x_{2t} is not value relevant and dirty surplus accounting, where transitory income components are excluded from income and bypassed to equity, makes sense. Transitory earnings increase book value on a one for one basis and this captures their full informational content. Separate display of transitory income to calculate comprehensive income is unnecessary. For valuation purposes, once total book value is taken into account, one can completely ignore transitory income components and focus on net income.

Together, the empirically documented relation between persistence and value relevance on the one hand and the Ohlson (1999) model on the other hand, provide a strong case in favour of excluding transitory income components from income.

Considering the performance reporting project and the division between historical cost income and fair value changes, the latter are obvious candidates to be considered as transitory (Barker, 2004). Under the assumption of market efficiency, fair value changes, for example, stock market gains and losses, do not predict themselves. Without the assumption of market efficiency, one would have to assume for instance that gains reveal management's skill in exploiting market inefficiencies in order to motivate the expectation that these gains will be persistent. Such an assumption is far from evident, especially for non-financial companies. It is also not obvious how remeasurements could be helpful in predicting historical cost income. In other words, a case can be made to consider fair value income as transitory. At the same time, it can be argued that current historical cost income is a good starting point to predict future historical cost income. The underlying logic is that, without any other *information*, an obvious assumption is that historical cost income will remain the same next year. This is not to say that, *ex post*, fair value income will always be transitory and historical cost income will always be persistent. An important task of financial analysis is precisely to investigate how present historical cost income will persist into the future. But given the *a priori* difference in expected time series properties, the division between historical cost income and fair value income seems like a sensible division for fundamental analysis and for the design of the income report.

How are earnings expectations formed in practice?

The empirical association studies and the Ohlson (1999) model indicate that reliance on net income, which excludes remeasurements, makes sense. To support their claim, both the association studies and the Ohlson model rely on the assumption that earnings expectations can be approximated by a time series model of earnings. This would only be descriptive of reality if investors rely on no other information than previous income numbers to form their expectations regarding future income numbers. In the Ohlson model, this assumption is expressed by the autoregressive equation (8a). In the association studies, an alternative attempt to increase the goodness of fit might have been to include other accounting or non-accounting variables in the regressions. Instead, by insisting on persistence, the complete task of incorporating information with regard to future accounting income was delegated to the current accounting income number. Ultimately, earnings are a random walk. However, this random walk notion essentially means that income has the characteristics of the macroeconomic permanent income concept (Kothari, 2001, p. 123). Permanent income can be defined as that constant income number whose discounted present value is equal to the present value of the expected income numbers. Hence, earnings become an indicator of future earnings power. Black (1993) offers one of the most spirited defences for such an income concept. But by insisting on a single number related to market value, the analyst is in fact delegating most of the real task of security analysis (Treynor, 1972). His responsibility is restricted to discounting current income with an appropriate discount rate. Since this income concept is essentially future oriented (Beaver and Morse, 1978) it should incorporate all elements of uncertainty that are involved in making predictions. However, several studies have documented that other information besides earnings is used to predict earnings. Beaver and Morse showed that the P/E ratio is far from constant and that this could not be explained by variations in interest rates. Instead, they demonstrated that the variation in P/E's could be explained by the transitory aspect of current earnings, indicating that market participants indeed differentiate between persistent and transitory earnings. Ou and Penman (1989) showed that other elements of the financial statements, besides earnings, contain information that can help users to ascertain persistence of earnings. Dechow *et al.* (1999) showed that a model that discounts analysts' forecasts beats a valuation model that is based on extrapolation of accounting earnings. According to Schipper (1991), analysts' forecasts consistently beat time series models of forecasting because the former incorporate other information, financial and non-financial, besides the history of accounting earnings. For instance, Riley *et al.* (2003) and Amir and Lev (1996) showed empirically the value relevance of non-financial information, respectively in the airline and wireless communication industry.

In conclusion, this empirical evidence does not suggest that market prices are formed relying exclusively on current net income, disregarding all other relevant information. On the other hand, for many users, high reliance on net income is certainly descriptive of their investment practice. A survey conducted by Bartlett and Chandler (1997) among private equity holders showed that financial statements are ill read and understood. According to Cornell (1993), P/E valuation analysis is not only restricted to lay users, but is one of the most common techniques used by trained bankers and investment analysts. Arnold and Moizer (1984), Moizer and Arnold (1984), Pike *et al.* (1993), Block (1999) and Demirakos *et al.* (2004) present evidence that confirms this statement. To a large degree, this can probably be explained by physical restrictions on users' available time, which precludes extensive investigation of financial reports and use of sophisticated valuation models. For instance, the analysts involved in the Hirst and Hopkins (1998) experimental research on comprehensive income followed on average sixty-six companies. Moreover, the increasing complexity of business environments and financial reporting rules probably exceeds cognitive limits of most users. Against this background, extreme reliance on summarizations to predict future earnings can be understood.

According to Ohlson (1999), if people do indeed rely on current income as a proxy to predict future income, they should ignore transitory earnings. So while the RIV model stresses that comprehensive income is the target of forecasting, Ohlson (1999) points out that net income should serve as a basis for that forecast. Separate knowledge of transitory income is useless from a valuation perspective. However this conclusion disregards a fundamental aspect of the nature of prediction for decision-making, which is to make an estimate of a future variable under conditions of uncertainty. The uncertainty aspect makes a mere point estimate insufficient when making a prediction. What is also required is the estimation of a confidence interval around this prediction, or at least some indication of the risk involved. In the Ohlson model, this issue is completely obscured. For the sake of simplicity, Ohlson (1999) assumes risk neutrality, which allows him to equal the discount rate to the risk free rate. However, for applied purposes, a more realistic assumption is risk aversion. Hence the discount rate should incorporate a certainty equivalent to reflect the estimated uncertainty around the mean predicted outcome. Moreover, since the residual income model clearly shows that it is comprehensive income that is to be predicted, it follows that it is the variance of comprehensive income, and not the variance of net income, that needs to be ascertained. In other words, the fact that transitory income components are unpredictable does not necessarily imply that they are incapable of influencing future comprehensive income in a significant way. Since comprehensive income $x_t = x_t^c = x_{1t} + x_{2t}$, disregarding covariances, this means that

$$\mathrm{var}^e(x_{t+1}) = \mathrm{var}^e(x_{t+1}^c) = \mathrm{var}^e(x_{1t+1}) + \mathrm{var}^e(x_{2t+1}) \geq \mathrm{var}^e(x_{1t+1}),$$

where var^e indicates the estimated variance of prediction. In other words, if transitory income components (x_2) are ignored when producing an estimate of uncertainty, and only the variance of net income $\mathrm{var}^e(x_{1t+1})$ is ascertained, this will lead to an underestimate of variance and create a false impression of stability. If *ex post* realizations of transitory income components are any indication of the extent of uncertainty involved in the estimation of comprehensive income, then the sole emphasis on net income seems unwarranted. In other words, for users relying on summarizations, there could be an advantage if net income and comprehensive income were presented jointly: While net income can serve as a proxy for predicting future income, comprehensive income could alert users to all possible other sources of comprehensive income, even though they are unpredictable.

CONSIDERING DOUBLE EPS REPORTING

Brief and Peasnell (1996, p. xi) indicate that the debate between proponents of net income and comprehensive income emerged out of two different viewpoints concerning the purpose of the income statement: telling the facts and predictive ability. Scrutinizing the arguments made by proponents of comprehensive income and net income indicates that an exclusive emphasis on any single income or EPS number seems unjustifiable, irrespective of the purpose one entertains. From an accounting-for-equity perspective, telling the facts turns out to be no cut and dry issue. While, in principle, the concept of capital maintenance seems to offer an unambiguous reference point by which income can be measured, determining income as the change in net wealth is not straightforward in practice. From a prediction perspective, net income can provide a starting point, but users should not ignore unpredictable transitory income components since these can help them to ascertain the total risk involved in estimating comprehensive income. Accordingly, it was suggested that the publication of two income totals and two EPS numbers, one for comprehensive and one for net income, is something that should be considered.

The suggestion to report two EPS numbers is aimed at the highest level of summarization of financial reporting. Given that for some users this might be the only, or most heavily weighed, element of financial reporting information that they acquire, several possible effects at the level of an individual user come to mind. Obviously, standard setters' concern for these matters depends on the extent to which they consider themselves responsible for users who act on a minimum of information. Naturally, issues of display are less important for users who conduct more thorough analysis of financial reports. Nonetheless, the very existence of the IASB project on the format of income presentation presupposes that the users targeted by the IASB indeed rely on some form of summarization. This should certainly be borne in mind when considering the possible consequences of double EPS publication.

One possibility is that a double EPS number would draw attention to the limitations of using an earnings number as a single valuation basis and that it would act as an incentive for users to conduct more thorough fundamental analysis. Fundamental analysis involves, next to an investigation of the complete financial report, consideration of a firm's strategy, its macroeconomic environment,

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its customers and suppliers and so on. Nevertheless, considerable emphasis on earnings and EPS can be observed. Some of this emphasis is excessive and users should preferably also consider other information (Lee, 1999). As already mentioned, the emphasis possibly follows out of an optimization process, whereby users balance the perceived advantage in terms of accuracy against the desire to minimize effort (Kleinmuntz and Schkade, 1993). One possible outcome is that the publication of two EPS numbers might increase the perceived benefit of further analysis. In other words, the difference between two earnings numbers might raise doubt about relying on a single earnings number. This could disturb the information gathering optimum towards a new optimum that involves the analysis of a richer set of information. Such a view presumes that, while accounting cannot fully protect users who act on a minimum of information, the conduct of fundamental analysis depends to some extent on how financial information is displayed. Of course, this relation is far from evident. An important motivation for users to rely on summarizations originates from time constraints and the inability to understand complex accounting issues. The publication of two EPS numbers would not change these restrictions and if these restrictions were binding, no change in conduct should be expected.

Even more dire consequences might be envisaged. A reporting format which advances two competing income numbers on an equal standing might be interpreted as a reflection of the inability of standard setters to reach consensus on the meaning and purpose of income and might highlight the deficiencies of a mixed measurement model. In that case, the publication of two EPS numbers might do nothing more than contribute to confusion and distrust of accounting numbers in general. As noted earlier (see note 1) this issue has been debated before.

Naturally, the analysis of the consequences of a double EPS number versus a single EPS number cannot be fully conducted until a particular single EPS number is envisaged. In other words, conclusions will differ depending on whether two EPS numbers are compared with a single net EPS or with a single comprehensive EPS. Since a typical error of judgment with a single net EPS number is overemphasis of the stability of the earnings number, two EPS numbers might potentially bring attention to transitory elements of comprehensive income, which might allow a user to get a richer understanding of risk. A possible danger with a single comprehensive EPS number is that users fail to interpret comprehensive income correctly and overreact to transitory income components as if they were persistent. The addition of net EPS might draw attention to the distinction between recurring and nonrecurring items. If it would indeed turn out so that the publication of a double EPS number alleviated both the possible flaws of single comprehensive income and of single net income EPS presentation, then display of two EPS numbers could be considered as advantageous.

Since most of these envisaged consequences relate to issues of interpretation and actual use of financial information, experimental research seems a natural research method to address these issues. Moreover, the absence of historical applications of two EPS numbers reporting precludes empirical archival research anyway.

CONCLUSION

An important function of income reporting could be that it draws attention to the arbitrary nature of the income number. According to Littleton, 'too many people regard the final figure of income as a fully established, indisputable fact' (Littleton, 1940, p. 22). Bedford (1971) goes even further and suggests that there does not even exist a concept of income. According to him, there are only various operational definitions of income, which each have different roles to play. Accordingly, some have even suggested that the income notion should be abandoned altogether and that financial reports should only convey disaggregated 'information' (Cornell and Landsman, 2003). However, such a radical view ignores the need for summarization that characterizes real world commercial, including financial, analysis. Besides, notwithstanding the wide dispersion of opinion regarding the appropriate operational definition, in essence, only two main definitions of income have crystallized out of this diversity; historical cost net income and fair value comprehensive income. This article argues that, from an accounting theoretical point of view and from a point of view of valuation, exclusive focus on either of these two single income numbers is unwarranted. The explicit admission of the standard setters of this fact by giving equal status to these two income numbers might expand, rather than reduce the importance of the income notion. If honesty is indeed the best policy, then prescription by standards setters requiring publication of two EPS numbers might act as a stimulus for users to conduct more thorough financial analysis and might alleviate the concerns for wrong interpretations that accompany the publication of a single EPS, whatever that the latter may be. With such a prescription there would be observables to test the speculations proposed here.

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GEORGE T. TSAKUMIS

The Influence of Culture on Accountants' Application of Financial Reporting Rules

The objective of this study is to examine the influence of national culture on accountants' application of accounting rules. Based on a refinement of Gray's (1988) framework, this study hypothesizes Greek accountants will be more likely (less likely) to recognize contingent liabilities (assets) than U.S. accountants (H1). It also hypothesizes that Greek accountants will be less likely to disclose the existence of both contingent assets and liabilities than U.S. accountants (H2). The results do not support H1. No significant differences are found between Greek and U.S. accountants' recognition decisions involving both contingent assets and liabilities. However, supplemental analyses show that U.S. accountants consistently exhibited more conservatism than Greek accountants. In line with expectations, Greek accountants are less likely to disclose information (i.e., were more secretive) than U.S. accountants, providing strong support for H2. Implications for both research and practice also are discussed.

Key words: Accounting; Conservatism; Contingencies; Culture; IFRS; Secrecy.

This study investigates the influence of national culture on accountants' application of accounting rules across countries, with particular emphasis on Gray's (1988) accounting values of conservatism and secrecy. Gray posits that the accounting values of conservatism and secrecy are related to and derived from Hofstede's (1980) cultural values.[1] Accounting values, in turn, influence the development of countries' financial reporting systems. Although Gray's[2] cultural accounting framework is primarily concerned with the effect of culture on a country's set of financial reporting rules, it is posited here that it is equally applicable to the manner in which a country's accountants interpret and apply those rules.

[1] Hofstede identifies four societal values, or 'cultural dimensions', which identify core values that attempt to explain general similarities and differences in cultures around the world: uncertainty avoidance, individualism, power distance and masculinity.

[2] Hereafter, 'Gray' refers to Gray (1988), unless noted otherwise.

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Based on the works of Hofstede[3] and Gray, the U.S. and Greece were selected to represent low and high conservatism and secrecy countries, respectively. An experiment was conducted to investigate the influence of culture on Greek and U.S. accountants' recognition and disclosure decisions.[4] Specifically, participants were asked to consider whether they would recognize or disclose a contingent asset or contingent liability based on the guidelines of a financial reporting standard. In addition, Hofstede's (1994) Values Survey Module (VSM) questionnaire was administered to subjects to verify that the cultural values of Greek and U.S. accountants are directionally consistent with indexes developed by Hofstede.[5]

Research investigating the effect of culture on accountants' financial reporting decisions has potentially significant implications for the global harmonization of accounting. One objective of harmonization is financial statement comparability across countries. The existence of a common set of financial reporting rules across countries is necessary, but not sufficient, to ensure the international comparability of financial statements. To realize this comparability objective, the rules also must be interpreted and applied consistently across countries. Research aimed at evaluating the impact of national culture on the application of a common set of financial reporting standards helps assess the relationship between national culture and the comparability of financial statements.

This study explicitly tests Gray's theoretical framework with respect to the conservatism and secrecy values at the individual level. The results suggest, at least with respect to contingencies, that culture may not play a role in the application of recognition rules (i.e., rules governing the recording of an event in the company's financial statements) across cultures, which in turn supports harmonization. Conversely, the results suggest that national culture does play a role in accountants' disclosure judgments (i.e., reporting an event in the notes to the financial statements), which could hinder the usefulness of financial statements prepared under a common set of accounting standards across countries.

LITERATURE REVIEW AND HYPOTHESES

Hofstede identifies four cultural dimensions[6] that attempt to explain general similarities and differences in cultures around the world and suggests that specific relationships exist between these cultural dimensions and individuals' preferences and actions. These dimensions are strong versus weak *uncertainty avoidance*, *individualism* versus collectivism, *masculinity* versus femininity, and large versus small *power distance*.[7] Gray proposes a connection between these cultural dimensions and countries' financial reporting systems. Specifically, Gray identifies four accounting values (professionalism, uniformity, conservatism and secrecy) and posits that accountants' levels of these accounting values are related to and derived from Hofstede's cultural values. Accounting values, in turn, affect the development of countries' financial reporting systems. Figure 1 presents Gray's framework for the relationship between culture, accounting values and financial reporting systems.

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[3] Hereafter, 'Hofstede' refers to Hofstede (1980), unless noted otherwise.

[4] The U.S. FASB defines recognition as, 'The process of formally recording or incorporating an item in the financial statements of an entity' (Epstein *et al.*, 2005, p. 66), while the disclosure of a financial event refers to showing the effects of the event in the notes to the financial statements.

[5] Only two previous accounting studies (Patel *et al.*, 2002; Patel, 2003) have verified that accountants are representative of their national culture.

[6] These dimensions are determined empirically from an attitude survey of approximately 116,000 IBM employees. These dimensions are: *uncertainty avoidance* (*UA*), the degree to which individuals in a society feel uncomfortable with uncertainty and ambiguity; *individualism* (*IND*), relates to people's self-concept of 'I' or 'we', or a society's preference for a loosely knit social fabric or a more interdependent, tightly knit social fabric; *masculinity* (*MASC*), the extent to which gender roles are

With respect to the impact national culture might have on the comparability of financial statements, this study views Gray's values of conservatism (a preference for a cautious approach to measurement) and secrecy (a preference for confidentiality and the restriction of disclosure of information about the business) as the most relevant characteristics.[8] Conservatism and secrecy represent values that are likely to manifest themselves (through an accountant's decision) in a set of financial statements and are important accounting values for the current study, which focuses on accountants' application of financial reporting rules across countries. Gray proposes, but does not test, two propositions that hypothesize relationships between conservatism and secrecy and Hofstede's cultural dimensions:

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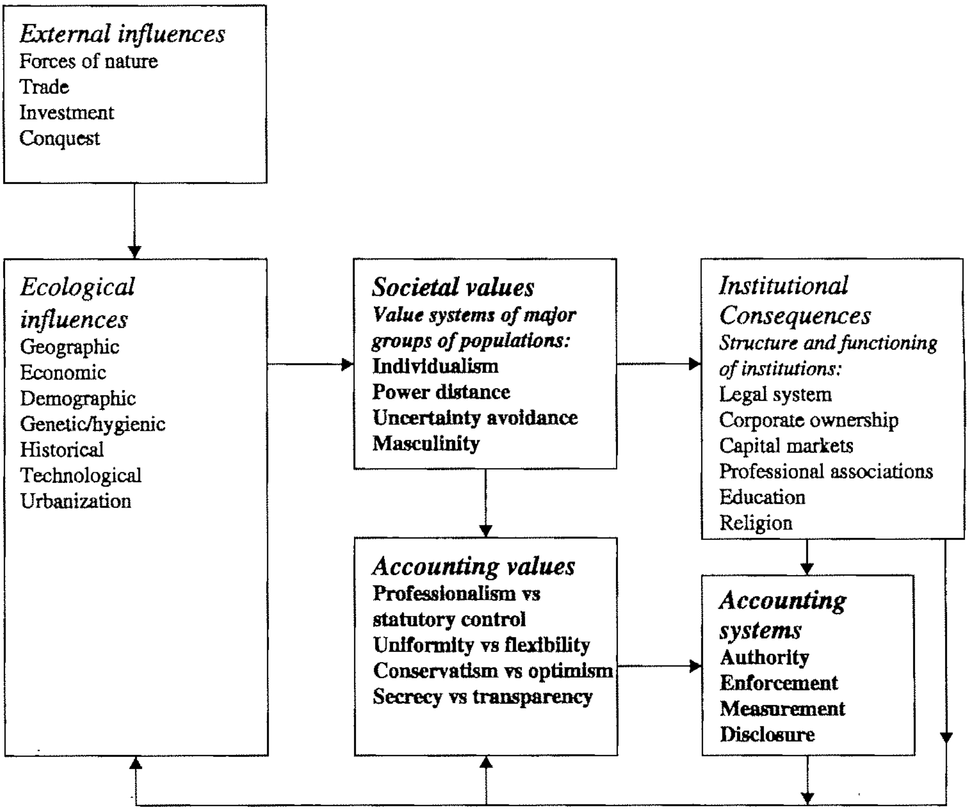
differentiated within a society and the extent to which traditional masculine values of performance and visible achievement are emphasized relative to traditional feminine values of relationships, caring and nurturing; and *power distance* (*PD*), the extent to which hierarchy and unequal power distribution in institutions and organizations are accepted. Hofstede's framework has been used extensively in numerous disciplines to examine the influence of culture on individuals' performance and decision-making (e.g., Lu *et al.*, 1999; Ryan *et al.*, 2000; Thomas and Bendixen, 2000). In addition, accounting studies (e.g., Schultz *et al.*, 1993; Cohen *et al.*, 1995; Harrison and McKinnon, 1999; Patel *et al.*, 2002) show that Hofstede's dimensions appear to capture the essence of national culture in a way that has been useful in academic research.

[7] Hofstede and Bond (1988) present a fifth dimension, long-term/short-term orientation (LTST), or the extent to which value is placed on a short-term versus long-term orientation. The current study excludes LTST because a valid score is not available for Greece. While other research (e.g., Merritt 2000) confirms the validity of Hofstede's dimensions across countries, this has not been done for Greece and LTST. Without a confirmed Greek cultural dimension score, it becomes difficult to assess any directional expectations for Greece on LTST.

[8] Gray (1988) supports this notion. He notes that conservatism would seem to be a significant accounting value because 'it is arguably the most ancient and probably the most pervasive principle of accounting valuation' (p. 10). In addition, he points out that 'secrecy, or confidentiality, in business relationships is a fundamental accounting attitude' (p. 11). Gray also suggests that conservatism and secrecy are closely related in that both values imply a cautious approach to corporate financial reporting in general, with conservatism relating to the measurement of information and secrecy relating to the disclosure of information.

FIGURE 1

GRAY'S CULTURAL ACCOUNTING FRAMEWORK[a]



Source: Gray (1988), adapted from Hofstede (1980).
[a] The items listed under *Societal values*, *Accounting values* and *Accounting systems* are not included in Gray's original figure and have been added.

> The *higher* a country ranks in terms of uncertainty avoidance and the *lower* it ranks in terms of individualism and masculinity then the more likely it is to rank *highly* in terms of **conservatism.**
>
> The *higher* a country ranks in terms of uncertainty avoidance and power distance and the *lower* it ranks in terms of individualism and masculinity then the more likely it is to rank *highly* in terms of **secrecy**. (pp. 10–11, emphases added)

Most of the studies that test Gray's hypotheses (Eddie, 1990; Salter and Niswander, 1995; Gray and Vint, 1995; Sudarwan and Fogarty, 1996; Zarzeski, 1996; Wingate, 1997; Jaggi and Low, 2000; Hope, 2003) have done so at the country level utilizing financial statement data and examine relationships between Hofstede's cultural dimension scores and one or more aspects of countries' financial reporting systems.

Gray's secrecy hypothesis has been subjected to the greatest amount of testing, presumably because available disclosure indexes (e.g., Bavishi, 1993) make it the easiest accounting value to operationalize. These studies provide strong support for Gray's hypothesized relationships between Hofstede's cultural values and secrecy. Fewer studies have examined the relationship between culture and Gray's conservatism accounting value. Of the studies that have done so, Eddie (1990) finds support for Gray's conservatism proposition, while Salter and Niswander (1995) and Sudarwan and Fogarty (1996) obtain mixed results for Gray's hypothesized relationships between Hofstede's cultural values and conservatism. This may be partly due to the difficulty in developing a country-level measure of a financial reporting system attribute like conservatism. For example, annual reports can be used relatively easily to develop disclosure measures, but are of limited use in developing a country-level conservatism measure.

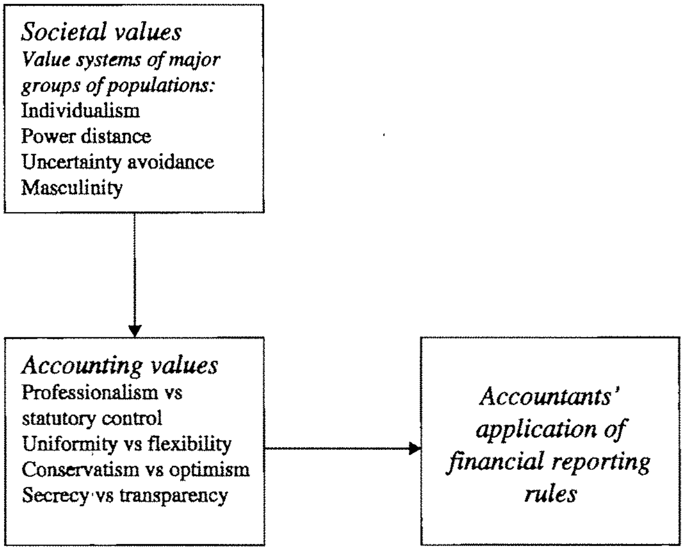
Five studies examine aspects of Gray's model at the individual, rather than the country, level. MacArthur (1996, 1999) finds that comment letters submitted to the IASC by corporate managers and accounting lobby groups from different countries exhibit preferences for conservatism and secrecy consistent with Gray's hypotheses. Roberts and Salter (1999) find general support for Gray's uniformity proposition in that Hofstede's cultural values significantly influence accountants' attitudes towards the uniformity of accounting rules. Schultz and Lopez (2001) show that accountants from countries with higher uncertainty avoidance resolve warranty expense estimates more conservatively than accountants from countries with lower uncertainty avoidance, which is consistent with Gray. Similarly, the results of Doupnik and Richter (2004) indicate that German accountants exhibit a conservatism bias in their interpretation of probability expressions. These studies provide evidence that accountants' opinions, attitudes and decisions are generally consistent with Gray's propositions. More importantly, this stream of research introduces the notion that Gray's framework can be tested at the individual level.

Therefore, it is posited that Gray's cultural accounting framework is equally applicable to accountants' financial reporting decisions. That is, accountants are expected to apply financial reporting rules in a fashion consistent with their cultural values. This relationship is presented in Figure 2. As a result, accountants' financial reporting decisions should differ across countries because of differences in the cultural values of the accountants applying the rules, especially those rules that require the application of judgment. Hofstede (2001) suggests that the more judgment an activity requires, the more it is ruled by values and thus influenced by cultural differences. As a result, he suggests that the rules of accounting and the way they are applied should vary along cultural lines.

Financial reporting decision tasks that require the use of judgment, along with countries that are likely to differ in terms of conservatism and secrecy, are required to examine this refined framework relationship. International Accounting Standard (IAS) 37, *Provisions, Contingent Liabilities, and Contingent Assets*, is a standard that requires substantial judgment and relates to both the recognition and disclosure of contingent assets and contingent liabilities. IAS 37 is used as the basis for a financial reporting decision task to test this relationship.

FIGURE 2

REFINEMENT OF PORTION OF GRAY'S FRAMEWORK


Societal values
Value systems of major groups of populations:
Individualism
Power distance
Uncertainty avoidance
Masculinity
Accounting values
Professionalism vs statutory control
Uniformity vs flexibility
Conservatism vs optimism
Secrecy vs transparency
Accountants' application of financial reporting rules

Previous research suggests that stronger findings may be generated if subjects are chosen from countries with large differences on Hofstede's cultural values (Gernon, 1993; Sivakumar and Nakata, 2001). The works of Hofstede and Gray were used as guidelines for identifying countries that are likely to differ on the accounting values of conservatism and secrecy. Gray hypothesizes classifications of country groupings by culture area as a basis for testing the relationship between culture and accounting systems. For example, he places 'Less developed Latin' (e.g., Mexico and Colombia) and 'Near Eastern' (e.g., Greece and Iran) countries at the highest level of conservatism and secrecy as opposed to 'Anglo' (e.g., U.S. and Australia) countries, which he suggests will exhibit the least conservatism and secrecy. Accountants in the U.S. and Greece were selected as subjects in this study to represent low and high conservatism and secrecy countries, respectively. Table 1 reports Hofstede's cultural index values for the U.S. and Greece.

Overall, the rankings in Table 1 are consistent with Greek accountants exhibiting more conservatism (i.e., a more cautious approach to measurement) than U.S. accountants. Accountants in higher conservatism cultures should be more likely to recognize liabilities and/or income decreasing events and less likely to recognize assets and/or income increasing events than accountants in lower conservatism countries. This study views recognition as the process of recording a financial event in a company's financial statements (e.g., recognition of a contingent liability (asset) results in reporting a liability (asset) on the balance sheet and a loss (gain) on the income statement). As such, in the context of IAS 37, Greek accountants should be more likely to recognize contingent liabilities on the balance sheet (i.e.,

Table 1

CULTURAL INDEX VALUES FOR GREECE AND THE U.S.

Cultural dimension	Greece	U.S.
Uncertainty avoidance (UA)	112 (1)[a]	46 (43)
Individualism/collectivism (IND)	35 (30)	91 (1)
Masculinity (MASC)	57 (18/19)	62 (15)
Power distance (PD)	60 (27/28)	40 (38)

UA = Hofstede suggests that societies high on the UA dimension prefer to reduce uncertainty or ambiguity by relying on written or unwritten rules of behavior, formalization of organizational structure, and standardization of procedures. By contrast, societies low on the UA dimension are more flexible and tolerant of behaviour and opinions that differ from their own.
IND = People focusing on themselves rather than on the group(s) to which they may belong characterize a high score on the IND index. Conversely, the person seen as a whole only when considered in terms of an in-group affiliation characterizes a low score on the IND index. It is the group, not the individual, that is seen as the basic unit of society.
MASC = A high score on the MASC dimension is characterized by competition and achieving material success. Conversely, a lower score is considered 'feminine' and is characterized by mentoring and attaining a higher quality of life.
PD = High PD societies are characterized by the acceptance of inequality and its institutionalization in hierarchies, which locate people in their 'rightful' places. Conversely, low PD societies are characterized by a norm value that inequalities between people should be minimized, and to the extent that hierarchies exist within a society and its organizations, they exist only for administrative convenience.
Source: Index values originally reported in Hofstede (1980, p. 315); rankings originally reported in Hofstede (1991, pp. 26, 53, 84, 113).
[a] Country rank in parentheses. Ranking is out of fifty countries and three regions.

a decrease in income in the income statement) and less likely to recognize contingent assets on the balance sheet (i.e., an increase in income in the income statement) than U.S. accountants. This leads to the following hypothesized interaction:

H1: Greek accountants are more likely to recognize contingent liabilities and less likely to recognize contingent assets than U.S. accountants.

The direction of differences on each of Hofstede's cultural dimensions also is consistent with Greek accountants exhibiting more secrecy (i.e., a greater preference for confidentiality and the restriction of disclosure of information) than U.S. accountants. Therefore, Greek accountants should be less likely than U.S. accountants to disclose the existence of both potential liabilities and potential assets in order to avoid disclosing confidential information to parties outside the organization. Within the context of this study, disclosure of a financial event means reporting the effects of the event in the notes to the financial statements. In the context of IAS 37, accountants in higher secrecy cultures should be less likely to disclose the existence of both contingent liabilities and contingent assets than accountants in lower secrecy countries. This leads to the following hypothesis:

H2: Greek accountants are less likely to disclose the existence of contingent liabilities and contingent assets than U.S. accountants.

RESEARCH METHOD

Design and Procedures

The study's hypotheses were tested using a 2 × 2 between-subjects design with national culture (Greek vs U.S.) and the nature of the contingency (asset vs liability) as independent variables and participants' recognition (conservatism) and disclosure (secrecy) decisions as the dependent variables. In late 2002 and early 2003, both the Soma Orkoton Elenkton Logiston (SOEL, or Greek Body of Sworn-in Accountants) and the South Carolina Association of CPAs distributed questionnaires during their financial reporting (i.e., auditing) training sessions. Since all participants were experienced accountants from a variety of firms (e.g., international, national, regional), they were deemed to be well-qualified for the financial reporting decision-making task that was required of them.[9] Each participant received a research instrument containing the instructions and experimental materials.

Participants were presented information on an accounting standard that addresses financial reporting for contingent assets and contingent liabilities. They were asked to assume they are accountants for a fictional company engaged in a lawsuit and to decide whether to recognize or disclose a contingent asset or contingent liability based on the guidelines of the accounting standard. Four scenarios were developed involving the following tasks: (a) contingent asset recognition, (b) contingent asset disclosure, (c) contingent liability recognition, and (d) contingent liability disclosure. Samples of the decision-making scenarios are presented in the Appendix.

Each participant received two independent scenarios: (a) one involving the recognition (disclosure) of a contingent asset, and (b) another involving the disclosure (recognition) of a contingent liability. To control for any order effect, the scenarios were crossed, resulting in four versions of the research instrument. No significant differences were found based on the differing presentation order of the scenarios. Table 2 outlines the four versions of the questionnaire.

Each participant was presented one recognition and one disclosure scenario. Although each participant responded to two scenarios, this is actually a between-subjects design where each subject can be viewed as participating in two experiments; the recognition scenario tests the conservatism hypothesis (H1) while the disclosure scenario tests the secrecy hypothesis (H2). Responses to the two recognition scenarios were used to test the conservatism hypothesis (H1). For these scenarios, participants were asked to decide whether to recognize an asset (liability) in the financial statements, as well as how much they would recognize based on an estimated range of damages. Responses to the two disclosure scenarios were used to test the secrecy hypothesis (H2). For these scenarios, participants were asked to decide whether to disclose a contingent asset (liability) in the notes to the

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[9] Firm type (i.e., whether a participant was employed with a Big 5 firm, national firm, regional firm, etc.) was included as a variable in the analyses and did not have a significant effect on the findings.

TABLE 2

QUESTIONNAIRE VERSIONS

	Order	Scenario	Decision	Hypothesis	
Version 1a:	First	1	Asset recognition	Conservatism	(H1)
	Second	2	Liability disclosure	Secrecy	(H2)
Version 1b:	First	2	Liability disclosure	Secrecy	(H2)
	Second	1	Asset recognition	Conservatism	(H1)
Version 2a:	First	3	Asset disclosure	Secrecy	(H2)
	Second	4	Liability recognition	Conservatism	(H1)
Version 2b:	First	4	Liability recognition	Conservatism	(H1)
	Second	3	Asset disclosure	Secrecy	(H2)

financial statements. A diagram outlining the research method and hypothesis testing procedures is presented in Figure 3.

Participants also were administered Hofstede's (1994) VSM questionnaire, which was used to calculate indexes for each subject groups' cultural dimensions.[10] The VSM was placed between the first and second financial reporting decisions to reduce the possibility of the first decision influencing the second. Finally, participants were asked to respond to demographic questions, background questions, and attitudinal items related to accounting conservatism.

Variables

Conservatism was operationalized as a decision to recognize or not recognize a contingent asset or liability (and corresponding gain or loss) in the financial statements. The decision was made on a 10-point scale numbered from 1 ('Definitely would not recognize') to 10 ('Definitely would recognize'). In addition, participants were asked to indicate the amount of asset and gain (liability and loss) they would report in the company's financial statements within a range of 5–10 million Euros or US$. Secrecy was operationalized as a decision to disclose or not disclose the existence of a contingent asset or liability in the notes to the financial statements. Again, this decision was made on a 10-point scale numbered from 1 ('Definitely would not disclose') to 10 ('Definitely would disclose').

Instrument Construction

A lawsuit was used as the background for the decision scenarios. According to *Accounting Trends and Techniques* (AICPA, 2000), lawsuits represent the most

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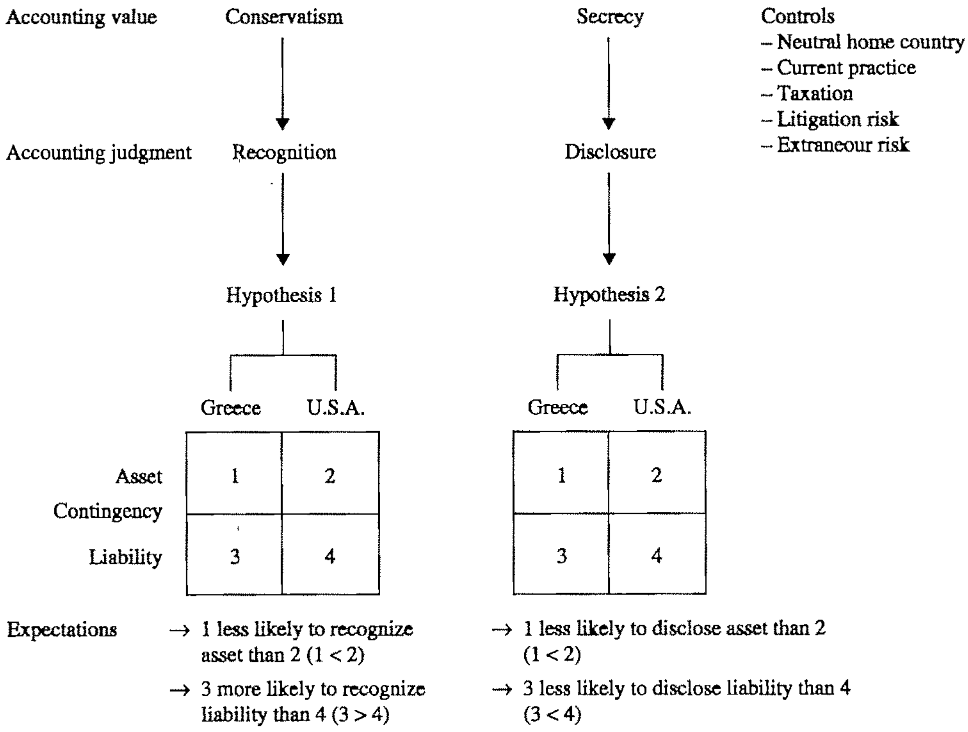
[10] Most previous research simply employs Hofstede's (1980) original scores to operationalize the culture variable. Although Hofstede (2001) suggests that his cultural dimension score differences between countries remain stable over time, they were not developed specific to accountants. Therefore, as in Patel *et al.* (2002) and Patel (2003), the current study calculates Hofstede's indexes for each subject group.

FIGURE 3

OUTLINE OF RESEARCH METHOD



common contingency reported in U.S. companies' annual reports. Therefore, a lawsuit represented a familiar scenario to U.S. accountants. Discussions with Greek accountants and a review of Greek annual reports revealed that lawsuits are a contingency situation faced by Greek accountants as well.

The research instrument provided participants with guidelines from an accounting standard that they were asked to apply in making financial reporting decisions in two litigation scenarios. The accounting standard was modelled after International Accounting Standard (IAS) 37, *Provisions, Contingent Liabilities, and Contingent Assets*. IAS 37 addresses both the measurement and disclosure of accounting information, which makes it suitable for testing both the conservatism and secrecy hypotheses.

Furthermore, IAS 37 was well-suited to the current study because it is a standard that requires considerable judgment. In order to apply IAS 37, accountants have to assess probability expressions such as 'virtually certain' (in the case of recognizing a contingent asset) and 'probable' (in the case of recognizing a contingent liability). Based on the facts surrounding the contingency, accountants must reach a decision on a proper accounting treatment. With respect to the lawsuits in the decision scenarios, participants were provided information on potential damages as well as the status of the lawsuits as of the end of the accounting period. The lawsuits in the decision scenarios are described in a way that makes it uncertain as to the ultimate outcome of the case (see Appendix). This was done to establish ambiguity in the scenarios and force participants to apply the relevant part of IAS 37 when making their judgments.

The research instrument also attempted to control for factors other than culture that were likely to influence accountants' financial reporting decisions. First, to neutralize any priors associated with the participants' home countries, the instrument instructed them to assume that they are employed with a company headquartered in Western Europe. To establish the equity market context in which the financial reporting decision was being made, participants were informed that their company is publicly traded and that the stock exchange regulator requires the reporting requirements they are being asked to apply. In addition, the instrument was imbued with controls for current accounting practice, taxation and litigation risk, which are discussed in more detail below.

Both Greece and the U.S. have rules governing accounting for contingent liabilities.[11] However, neither country's rules have procedures for the recognition of contingent assets. More importantly, at the time data were gathered, neither country required companies to follow IAS 37. Therefore, IAS 37 acted as a control for current accounting practice. Specifically, participants were informed that stock exchange regulators require the use of the accounting standard. This assisted in isolating the impact of culture on accountants' financial reporting judgments independent of their country's existing rules.

The Greek Tax Records Code prescribes the accounting records and related data that must be kept by all Greek companies. As a result, the national tax code strongly influences the calculation of corporate income. Therefore, participants also were instructed that there were no tax implications to their decision. This acted as a control to discourage Greek accountants from basing their decisions on potential tax consequences.

Wingate (1997) reports that the U.S. has a higher litigation index than Greece (higher litigation indexes indicate greater litigation risk). To address this issue, participants were informed that accountants in the Western European country in which the company is based rarely are sued. This was done primarily to discourage U.S. accountants from basing their responses on litigation risk. To avoid any extraneous accounting and risk concerns, participants were informed that both parties to the lawsuit possess good management, sound financial health, stable performance over time, and that all estimated amounts are material (Schultz and Lopez, 2001).

Instrument pretesting was conducted using accountants in the U.S. The pretests were used to ensure that the instrument was understandable, to reveal errors in the design, and to identify potentially inadequate controls. Pretesting with academic colleagues also was conducted to further refine the instrument. Based on pretesting feedback, the wording of the scenarios was modified to highlight better the ambiguity inherent in the decisions. After pretesting, the English version was reviewed. A native Greek speaker familiar with business terminology translated the instrument into Greek. A second native Greek speaker retranslated the instrument back into English, and any discrepancies were carefully resolved. In addition, any U.S. dollar estimates in the English language version were translated into Euros in the Greek version. At the time of the study, the approximate US$/Euro exchange rate was 1 to 1.

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[11] At the time of this study, the format of Greek financial statements was based on the European Community's Fourth Directive, which covers provisions for liabilities and charges of uncertain amount or timing in Article 20. U.S. companies follow SFAS 5, *Accounting for Contingencies*.

RESULTS

Response Rates and Demographics

Table 3 presents demographic information for the 101 participants. Responses were received from 52 Greek and 49 U.S. accountants for response rates of 45 per cent and 73 per cent, respectively. The Greek and U.S. participants had an average of approximately fifteen and seventeen years of professional accounting experience, respectively. All of the participants were born in their home countries, and all but three of the Greek participants received their highest level of education there. These data suggest that the participants are representative of their cultures. These and several other variables (e.g., age, work experience, gender, level of education, prior contingency experience, firm type) were tested and did not have a significant effect on the overall findings. In addition, the results remain the same when analyses are conducted excluding Greek accountants who received their highest level of education outside of Greece.

Experimental Checks

Given that national culture is not a manipulated variable, Hofstede's (1994) VSM questionnaire was used to calculate indexes for each group's cultural dimensions.

TABLE 3

PARTICIPANT DEMOGRAPHICS

	Greece	U.S.A.
Number of participants	52	49
Work experience (mean in years)	15	17
Nationality at Birth		
Greek	52	—
U.S.A.	—	49
Country of education		
Greece	49	—
U.S.A.	—	49
Other	3	—

This acted as a check to ensure that the cultural values of Greek and U.S. accountants were directionally consistent with Hofstede's original study, and that directional hypotheses are correctly stated. Three of the four cultural value indexes are consistent with Hofstede's original study. Specifically, the Greek sample scored higher on uncertainty avoidance and power distance (90 and 49) than the U.S. sample (42 and 28). The Greek sample also scored lower on individualism (74) than the U.S. sample (100), as expected. However, contrary to Hofstede, the Greek sample scored higher on masculinity (83) than the U.S. sample (25). Gray suggests that masculinity plays a less important role than the other dimensions in determining the level of both conservatism and secrecy in a country. Therefore, from a theoretical standpoint, this discrepancy does not present a serious cause for concern.

Almost all of the participants passed the manipulation check question: 'Without returning to the previous page, please indicate whether the scenario you read involved a contingent asset or a contingent liability'. For the conservatism scenarios (i.e., the scenarios used to test H1), 88 participants responded correctly to the question (87%). Thirteen participants either failed to respond (Greece: $n = 5$; U.S.: $n = 5$) or responded incorrectly (Greece: $n = 3$) to the conservatism manipulation check question. For the secrecy scenarios (i.e., the scenarios used to test H2), 92 participants responded correctly to the question (91%). Nine participants either failed to respond (Greece: $n = 3$; U.S.: $n = 4$) or responded incorrectly (Greece: $n = 1$; U.S.: $n = 1$) to the secrecy manipulation check question. Results discussed below remain the same when tests are conducted with and without data from the participants who did not respond or responded incorrectly to the manipulation check question. Reported results are based on the full sample.

Hypothesis Testing Results

Test of H1 H1 predicted that Greek accountants would be more likely to recognize contingent liabilities and less likely to recognize contingent assets than U.S. accountants. This hypothesis was tested with a 2 × 2 ANOVA with CULTURE (Greek vs U.S.) and NATURE OF CONTINGENCY (asset vs liability) as the independent variables and accountants' recognition decisions as the dependent variable.

The ANOVA results in Table 4 do not support H1. As reported in Panel A, the overall model is not significant ($F = 1.54$; $p = .21$). The results also indicate that CULTURE ($F = .004$; $p = .95$) and NATURE OF CONTINGENCY ($F = 2.67$; $p = .11$) are insignificant. Most importantly, the interaction term ($F = 2.06$; $p = .93$) also is not significant; thus, H1 is not supported.

An evaluation of the cell means for participants' conservatism judgments (Table 4, Panel B) suggests that, contrary to expectations, Greek accountants are more likely than U.S. accountants to recognize contingent assets ($M = 5.87$ vs $M = 4.96$) and less likely to recognize contingent liabilities ($M = 6.00$ vs $M = 7.00$). Although the differences in means are not statistically significant at conventional levels, the direction of the mean differences suggests that Greek accountants are

TABLE 4

RESULTS OF HYPOTHESIS TESTING (H1)

Panel A: ANOVA results for H1

Variable	F	p-value (2-tailed)
Model	1.54	.21
Variables		
(1) CULTURE	.004	.95
(2) NATURE OF CONTINGENCY	2.67	.11
Test variable		
(1) × (2) interaction	2.06	.93*

Panel B: Mean recognition judgments[a] by condition (standard deviation)

		Culture		
		Greece	U.S.A.	Overall
Nature of contingency	Asset	5.87 (3.31) $n = 23$	4.96 (3.50) $n = 24$	5.40 (3.40) $n = 47$
	Liability	6.00 (2.94) $n = 29$	7.00 (3.61) $n = 25$	6.46 (3.36) $n = 54$
	Overall	5.94 (3.08) $n = 52$	6.00 (3.66) $n = 49$	

* Indicates one-tailed p-value.

[a] Subjects made their decisions on a scale from 1 = definitely would not recognize to 10 = definitely would recognize.

less conservative than U.S. accountants. Supplemental analyses were conducted to provide additional insight into this observation.

First, a within-groups t-test shows that U.S. accountants were significantly more likely to recognize a contingent liability than a contingent asset ($M = 7.00$ vs $M = 4.96$; $t = 2.01$, $p = .05$), providing strong evidence of U.S. participants' conservatism. Although Greek accountants also were more likely to recognize contingent liabilities than contingent assets ($M = 6.00$ vs $M = 5.87$), the difference is not statistically significant ($t = .15$; $p = .88$).

Second, the research instrument asked participants to indicate their agreement or disagreement with six statements related to accounting conservatism. Table 5 presents Greek and U.S. accountants' mean responses to the conservatism statements and the related t-test results. Three significant differences were found.

TABLE 5

MEAN RESPONSES TO CONSERVATISM ITEMS

	Mean[a]		t	p-value (2-tailed)
	Greece	U.S.A.		
1 Revenues and gains always should be reported at a higher rather than a lower amount	3.47	4.36	5.11	.0001**
2 Revenues and gains always should be reported earlier rather than later	2.74	4.13	6.76	.0001**
3 Expenses and losses always should be reported at a higher rather than a lower amount	3.08	3.04	.15	.8800
4 Expenses and losses always should be reported earlier rather than later	2.86	2.52	1.43	.1600
5 Assets always should be reported at a higher rather than a lower amount	2.96	4.17	5.98	.0001**
6 Liabilities always should be reported at a higher rather than a lower amount	3.36	3.07	1.24	.2200

[a] Subjects provided responses on a scale from 1 = strongly agree to 5 = strongly disagree.
** Significant at the .01 level.

Specifically, U.S. accountants showed significantly less agreement with statements related to recognizing revenues, gains and assets earlier and at larger amounts (i.e., statements 1, 2 and 5) than Greek accountants, providing further evidence of U.S. participants' conservatism. In addition, although the *t*-tests for conservatism statements 3, 4 and 6 are not statistically significant, the directions of the differences in means indicate that U.S. accountants expressed greater agreement with statements related to recognizing expenses, losses and liabilities earlier and at higher amounts than Greek accountants.

Finally, an additional 2 × 2 ANOVA was performed with CULTURE and NATURE OF CONTINGENCY as the independent variables and the US$ or Euro amount accountants recommended to be recognized as the dependent variable.[12] A significant NATURE OF CONTINGENCY main effect ($F = 10.35$; $p = .002$) was found. This is driven by the result that both Greek and U.S. accountants were significantly more likely to recognize greater amounts for liabilities ($M = 7{,}348{,}485$) than assets ($M = 5{,}642{,}857$). However, although differences in mean amounts were insignificant, Greeks recommended a higher mean amount of contingent gain (5,653,846 vs 5,625,000) and U.S. accountants recommended a higher mean amount of contingent loss (7,472,222 vs 7,200,000), which is consistent with the U.S. participants being more conservative.

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[12] In addition to indicating how likely they would be to recognize an asset or liability, subjects also were asked to indicate the amount that they would recognize (between 5,000,000 and 10,000,000 Euros or US$). Only subjects who indicated they would recognize an asset or liability (i.e., selected 6 or higher on a 10-point scale) were included in this analysis.

TABLE 6

RESULTS OF HYPOTHESIS TESTING (H2)

Panel A: ANOVA Results for H2

Variable	F	p-value (2-tailed)
Model	9.83	.0001
Variables		
(1) CULTURE	16.69	.0001*
(2) NATURE OF CONTINGENCY	11.24	.001
Test variable		
(1) × (2) Interaction	.72	.40

Panel B: Mean Recognition Judgments[a] by Condition (Standard Deviation)

		Culture		
		Greece	U.S.A.	Overall
Nature of contingency	Asset	4.83 (3.15) $n = 29$	6.68 (3.35) $n = 25$	5.69 (3.35) $n = 54$
	Liability	6.26 (3.12) $n = 23$	9.08 (1.21) $n = 24$	7.70 (2.73) $n = 47$
	Overall	5.46 (3.19) $n = 52$	7.86 (2.79) $n = 49$	

* Indicates one-tailed p-value.

[a] Subjects made their decisions on a scale from 1 = definitely would not recognize to 10 = definitely would recognize.

Test of H2 H2 predicted that Greek accountants would be less likely than U.S. accountants to disclose the existence of both contingent assets and contingent liabilities. This hypothesis was tested with a 2 × 2 ANOVA with CULTURE (Greek versus U.S.) and NATURE OF CONTINGENCY (asset versus liability) as the independent variables and participants' disclosure decisions as the dependent variable. A significant CULTURE main effect would provide support for H2.

The ANOVA results in Table 6 provide support for H2. As reported in Panel A, the overall model is significant ($F = 9.83$; $p = .0001$). The results also reveal that the CULTURE ($F = 16.69$; $p = .0001$) main effect is significant, providing strong support for H2. In addition, the results indicate that the NATURE OF CONTINGENCY main effect is significant ($F = 11.24$; $p = .001$). This is driven by the result that both

Greek and U.S. accountants were significantly more likely to disclose contingent liabilities, as evidenced by the marginal means shown in Panel B ($M = 7.70$ vs $M = 5.69$). Finally, the interaction term is not significant ($F = .72$; $p = .40$).

An evaluation of the means in Panel B reveals that the differences are in the predicted directions. Specifically, U.S. accountants ($M = 7.86$) were more likely to disclose the existence of a contingency than Greek accountants ($M = 5.46$), as expected. In addition, Panel B reveals that this was the case for both contingent assets ($M = 6.68$ vs $M = 4.83$) and contingent liabilities ($M = 9.08$ vs $M = 6.26$).

CONCLUSIONS

This study conducted an experiment to investigate the impact of national culture on accountants' recognition and disclosure decisions. H1 hypothesized that Greek accountants would be more likely to recognize contingent liabilities and less likely to recognize contingent assets than U.S. accountants. H2 hypothesized that Greek accountants would be less likely to disclose the existence of both contingent assets and liabilities than U.S. accountants.

The results do not support H1. No significant differences were found between Greek and U.S. accountants' recognition decisions involving both contingent assets and contingent liabilities. There are two possible explanations for this result.

The first explanation is that Gray's theory is flawed. It is important to note that the results of prior research examining Gray's framework with respect to conservatism in national accounting systems are mixed (Eddie, 1990; Salter and Niswander, 1995; Sudarwan and Fogarty, 1996). Therefore, it is not possible to rule out the possibility that this study's lack of support for H1 is a result of faulty theory.

The second possible explanation for the lack of support for H1 is that, due to the nature of the experimental task, other factors (i.e., institutional consequences) may have outweighed culture in influencing the participants' decisions. Although the research instrument controlled for several institutional consequences (i.e., home country rules, taxation, capital markets and litigation risk), it is possible that the sensitive nature of the recognition tasks (e.g., recognizing a number in the financial statements that affects both net assets and net income) could have affected participants' responses, particularly for the U.S. accountants. Recent accounting scandals and resulting changes in the U.S. regulatory environment might have sensitized U.S. accountants against overstating net income, causing them to be more cautious (i.e., conservative) in their recognition of contingencies than the Greek accountants. Future research may wish to re-examine Gray's conservatism proposition at the individual level to determine whether the result obtained in this study is generalizable to other decision contexts and other countries.

With respect to the accounting value of secrecy, the results reveal that Greek accountants were significantly less likely than U.S. accountants to disclose the existence of both contingent assets and contingent liabilities, providing strong support for H2. This result suggests that Gray's predicted relationships between

Hofstede's cultural values and secrecy may be applicable to individual accountants' disclosure decisions, as hypothesized. Support for H2 but not for H1 might be due to the possibility that accountants' disclosure decisions are more heavily influenced by cultural values than are recognition decisions. Specifically, the less sensitive nature of the disclosure task may have caused it to be viewed as a less important decision. That is, participants may not have viewed the disclosure decision as one with as many consequences as a recognition decision (e.g., affecting financial ratios and management compensation). Therefore, individuals' disclosure decisions may be more strongly influenced by cultural values.

This study has potential practical implications. The lack of support for H1 suggests that the consistent application of a common contingency recognition rule across countries with different cultures may be possible. This is good news for proponents of harmonization. However, further research is needed to ensure that this result is generalizable to other decision contexts and cultural areas. The results in support of H2 suggest that national culture does play a role in accountants' disclosure judgments. The result that Greek and U.S. accountants reached significantly different decisions when presented with the same facts and financial reporting guidelines suggests that uniform accounting standards may not result in similar disclosure decisions being made across countries. It is possible that different disclosure judgments could hinder the comparability of financial statements across countries. This study examined disclosure in a single context (contingencies). The generalizability of this result to other disclosure decisions and cultural areas is worth investigating to determine the real impact of culture on the comparability of financial statement disclosures made in accordance with International Financial Reporting Standards.

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APPENDIX

SCENARIO TO TEST H1 (CONSERVATISM) IN A CONTINGENT LIABILITY CONTEXT

Assume that you are the chief financial accountant for Brown, Inc., a publicly traded company located in a Western European country. In this country, companies and their accountants are rarely sued. The national stock exchange regulator requires the use of an accounting standard for **contingent liabilities**. You must determine how this standard should be applied in light of the facts in the scenario presented below. In addition, financial accounting income is not used as the basis for taxation. Therefore, the manner in which you apply the standard will have **no impact on your company's taxable income.**

The accounting standard provides the following definition and reporting requirements for recognizing **contingent liabilities**:

> A **contingent liability** represents a possible outflow of economic resources that arises from past events and whose existence will be confirmed only by the occurrence or non-occurrence of one or more uncertain future events. If there is an obligation that ***more likely than not*** will require an outflow of resources, then a liability should be **recognized on the balance sheet along with a decrease in financial accounting income**.

Scenario Facts

Assume that **you are the chief financial accountant for Brown, Inc.** You are in the process of preparing Brown's 2001 financial statements.

In March 2001, Brown, Inc. was named as the **defendant** in a lawsuit alleging infringement of certain patent rights. Another company alleges that Brown is illegally using its patented paint manufacturing process. As a result, the other company has sued and is seeking damages from Brown, Inc.

Both companies are reputable companies managed by well-trained, competent professionals. In addition, both companies' financial performance has been sound with stable operating results over the last several years.

In November 2001, Brown's legal counsel informs you that they are interested in negotiating a financial settlement with the plaintiff's lawyers. Legal counsel estimates that any settlement could be between $5,000,000 and $10,000,000, which represents a material amount to Brown, Inc. No discussions had taken place at the time of preparing financial statements for the year ended December 31, 2001.

The Decision

Again, **assume that you are the chief financial accountant for Brown, Inc.** and that you must decide on the proper accounting treatment of the legal action brought against Brown. **Based on the requirements of the accounting standard for contingent liabilities provided above**, at Brown's year-end (December 31, 2001):

> ***On the scale below, please indicate whether you would recognize a liability (and a decrease in financial accounting income) on the Brown, Inc. balance sheet (income***

statement) for the year ended December 31, 2001. Please circle one of the numbers below to indicate the strength of your choice.

1 2 3 4 5 | 6 7 8 9 10

Definitely Would Not Recognize	Definitely Would Recognize

If you were going to recognize a liability along with a decrease in financial accounting income, how much would you recognize? Please indicate an amount between $5,000,000 and $10,000,000.

SCENARIO TO TEST H2 (SECRECY) IN A CONTINGENT ASSET CONTEXT

Assume that you are the chief financial accountant for Cool Water Corp., a publicly traded company located in a Western European country. In this country, companies and their accountants are rarely sued. The national stock exchange regulator requires the use of an accounting standard for disclosing **contingent assets**. You must determine how this standard should be applied in light of the facts in the scenario presented below. In addition, financial accounting income is not used as the basis for taxation. Therefore, the manner in which you apply the standard will have **no impact on your company's taxable income**.

The accounting standard provides the following definition and reporting requirements for disclosing **contingent assets**:

> A **contingent asset** represents a possible inflow of economic resources that arises from past events and whose existence will be confirmed only by the occurrence or non-occurrence of one or more uncertain items. If the inflow of economic benefits is ***more likely than not***, then a contingent asset should be **disclosed in the notes to the financial statements**. Disclosure should include a brief description of the nature of the contingent asset and, where practicable, an estimate of the financial effect.

Scenario Facts

Assume that **you are the chief financial accountant for Cool Water Corp.** You are in the process of preparing Cool Water's 2001 financial statements.

As of March 2001, Cool Water is the **plaintiff** in a lawsuit alleging infringement of certain patent rights. Cool Water alleges that another company is illegally using its patented bacteria-free water bottling process. As a result, Cool Water has sued and is seeking damages from the company.

Both companies are reputable companies managed by well-trained, competent professionals. In addition, both companies' financial performance has been sound with stable operating results over the last several years.

In November 2001, Cool Water's legal counsel informs you that the defendant's lawyers are interested in negotiating a financial settlement. No discussions had taken place at the time of preparing financial statements for the year ended December 31, 2001.

The Decision

Again, **assume that you are the chief financial accountant for Cool Water Corp.** and that you must decide on the proper accounting treatment of the legal action taken by Cool Water. **Based on the requirements of the accounting standard for contingent assets provided above**, at Cool Water's year-end (December 31, 2001):

On the scale below, please indicate whether you would disclose the existence of the lawsuit in the notes to Cool Water's financial statements for the year ended December 31, 2001. Please circle one of the numbers below to indicate the strength of your choice.

1	2	3	4	5	6	7	8	9	10
Definitely Would Not Disclose									Definitely Would Disclose

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R. G. WALKER

Reporting Entity Concept: A Case Study of the Failure of Principles-Based Regulation

Since 1990 a key element of Australia's regulatory arrangements has been reliance on a 'principles-based' rule to the effect that all 'reporting entities' should prepare general purpose financial reports (GPFRs) that comply with accounting standards. The concept of reporting entity was defined in terms of whether it was 'reasonable to expect the existence of users' who were dependent on GPFRs for information which will be useful to them when making and evaluating decisions about resource allocation. Australia's differential reporting arrangements are reviewed so as to highlight the extent to which reliance is placed on practitioners to apply the 'reporting entity' rule for entities other than publicly listed corporations or borrowing corporations. Illustrations are provided of how this 'principles-based' rule has been ignored. This experience suggests that there is little reason to expect full observance of a principles-based rule, if reliance is placed upon practitioners to ensure compliance.

Key words: Differential reporting; Principles; Regulation; Reporting; Rules.

As a consequence of accounting and auditing failures, such as those recently experienced in the U.S.A., Australia and elsewhere, it has been suggested that a higher quality of financial reporting is likely to be experienced if the regulation of financial reporting is based on principles-based accounting standards rather than detailed rules (IFAC, 2003; see also sources cited by Schipper, 2003). While there is room to contest the basis of this analysis (Schipper, 2003; Bennett *et al.*, 2006) the underlying argument—that regulatory arrangements based on statements of principles are likely to produce better outcomes than sets of detailed rules—can be challenged in the light of currently available evidence.

It is contended that there has been a fundamental failure of Australian regulatory arrangements to secure appropriate standards of accountability by major vehicles for the organization of economic activities, and that this failure can be attributed to reliance on principles-based rules, in the form of prescriptions that all 'reporting entities' should prepare general purpose financial reports that comply with accounting standards. A principles-based rule to this effect has been in force in Australia (in one form or another) since 1990.

The possibility of introducing a similar rule is currently on the agenda of both the International Accounting Standards Board (IASB) and the U.S.A.'s Financial

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Accounting Standards Board (FASB). In September 2006 both boards reaffirmed a prior decision:

> that the reporting entity concept should not specify which entities should be required to prepare general purpose external financial reports (GPEFR). Rather, an entity that chooses to, or is required to, prepare GPEFR would be a reporting entity (FASB Project Update, 12 October 2006).

It would appear from this statement that the standard setters are considering the adoption of 'reporting entity rule' drafted in a similar fashion to that currently in place in Australia (so that the rule would not specify what types of entity should be obliged to publish general purpose reports). This approach is likely to fail. As explained below, if the concept of 'reporting entity' is only outlined in general terms, and is not accompanied by listings of the types of commercial or not-for-profit vehicles that are expected to prepare GPEFRs, then there is little reason to expect full observance of a principles-based rule.

This article first explores what is intended by references to 'principles-based' rules. It then reviews regulatory arrangements applying to organizations in which there are stakeholders who might be expected to make use of audited general purpose financial reports (GPFRs), if they were available, and identifies the extent to which reporting arrangements rely on accounting professionals to ensure that 'reporting entities' are identified as such, and that they prepare general purpose financial reports (GPFRs). It provides four illustrations of how differing but major forms of vehicle for the organization of economic activity have disregarded 'principles-based' rules. Finally, it explores some reasons for this failure, and reviews some options for reform.

'PRINCIPLES' AND 'PRINCIPLES-BASED' ACCOUNTING RULES

The use of the term 'principle' in technical discussions of accounting has a long but troubled history. By 1920, several U.S. textbooks were titled *Accounting Principles* (Racine) or *Principles of Accounting* (Gilman, Wildman, Paton and Stevenson) (see bibliography in Paton and Stevenson, 1920, p. 675). In this context, 'principles' were the facts and concepts upon which accounting analysis was based. Texts on accounting principles were explanations of the basic elements of accounting practice. The label 'principles of accounting' continues to be applied to introductory courses in the subject.

A more specific and technical meaning of the label appears to have been popularized and introduced into the accounting lexicon in the U.S.A. in the 1930s. Responding perhaps to criticisms of accounting practice in the aftermath of the 1929 stock market crash, the American Institute of Accountants had established committees aimed at developing rules of practice in cooperation with stock exchanges and investment bankers, and to develop 'accounting principles' (see May, 1943; Grady, 1965; Storey, 1965; Zeff, 1972). In 1932 an AIA committee had suggested that the 'broad principles to be laid down . . . should be few in number'—and as an appendix to correspondence with the Committee on Stock

List of the New York Stock Exchange, provided a tentative list of five items.[1] The listing appears to reflect concerns about 'creative accounting' or misleading practices that had been followed by some corporations (see e.g. Ripley, 1927) rather than addressing fundamental objectives of accounting or proposing that accounting practices should be consistent in applying specific concepts. Moreover, contrary to the interpretations placed on this by other authors (e.g., Alexander and Jermakowicz, 2006, p. 142), the AIA committee was not *recommending* adoption of these propositions. The listing was only to illustrate some issues that had 'won fairly general acceptance'. The main thrust of the Committee's advocacy was anti-regulation. It argued that, 'within the limits of these broad principles . . . no attempt [should be made] to restrict the rights of corporations to select detailed methods of accounting deemed by them to be best adapted to the requirements of their business', provided they provided a 'statement of the methods of accounting and reporting employed' and were consistent in their application of those methods over time (May, 1943, p. 80).

Regardless of the anti-regulatory stance of the accounting profession, the Roosevelt administration soon introduced legislation imposing comprehensive federal oversight over trade in securities and which led to standardization of financial reporting. The Securities Act of 1933 provided for the registration of security issues. Initially the Federal Trade Commission (FTC) was responsible for the administration of this statute, and empowered to determine the content of registration statements. The FTC proposed that these statements were to include balance sheets and income statements 'in such detail and such form as the Commission may prescribe' (Securities Act of 1933, Schedule A, paras 25–26). Borrowing from English Companies Act requirements, the FTC proposed that auditors should report whether the financial statements were 'true' (May, 1943). Coupled with requirements that officers of a corporation would be liable if the content of registration statements was misleading, this was the subject of widespread concern, and auditors in particular faced unwelcome exposure (Weidenhammer, 1933; May 1934).

Shortly afterwards the Securities and Exchange Act of 1934 established the Securities and Exchange Commission (SEC) to administer the securities acts, and one of its first steps (apparently in response to pressure from the profession) was to revise the text of the audit report. The FTC had already changed its stance somewhat to require a certificate that the financial statements 'truly and fairly reflect the application of accepted accounting principles to the facts disclosed by our investigation' (May, 1934). The SEC introduced a new phrasing: that the financial statements were 'presented fairly in accordance with generally accepted accounting principles'.

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[1] The list was as follows: 'unrealized profit should not be credited to income account . . . either directly or indirectly'; 'capital surplus, however created, should not be used to relieve the income account . . . of charges which would otherwise fall to be made thereagainst'; 'earned surplus of a subsidiary company created prior to acquisition does not form part of the consolidated earned surplus'; 'while it is in some circumstances permissible to show stock of a corporation held in its own treasury as an asset . . . the dividends on stock so held should not be treated as a credit to the income account of the company'; 'notes or accounts receivable from officers, employees or affiliated corporations must be shown separately'. As reproduced in May (1943, pp. 81–2).

The immediate impact of this revised wording was two-fold.

First, whereas many audit firms has prepared 'long form' audit reports on the financial affairs of corporations (see the 1932 edition of Patón's *Accountants' Handbook* for some examples), reporting practices rapidly moved to a stereotyped and standardized statement about the financial statements. (The 1947 edition of Paton's *Accountants' Handbook* illustrates the abbreviated forms of audit reporting that emerged after the establishment of the SEC).

Second, the American Institute was faced with the realization that while practitioners were expected to report on whether financial statements were in accord with accepted 'accounting principles', neither academics nor the profession had articulated those principles (beyond the tentative listing suggested in 1932). There began a search for accounting principles that was to dominate the technical agenda of the American Institute (and its successor the AICPA) for decades. The American Accounting Association followed suit. When it was reorganized in 1935 the AAA notes that 'there is still no authoritative statement of essential principles available on which accounting records and statements may be based', and stated that one if its objectives was 'to develop accounting principles, and standards, and to seek their endorsement or adoption by business enterprises, public and private accountants, and government bodies' (AAA, 1936).

There were dissenting voices. Gilman (1939) suggested that

> the frank admission that there are no principles of accounting will leave the accounting profession in the more defensible position of being guided by general doctrines, specific conventions, and various rules, practices, methods, and standards derived from the relationship between accounting and other fields, which by the test of experience have proved practical and reasonable. (p. 257)

G. O. May had been the chairman of the American Institute's 1932 Committee; it has been suggested that the Committee's references to 'accepted accounting principles' was 'basically his work' (Storey, 1965, p. 12). However, May later opined that references to the term 'accounting principles' involved the use of persuasive language that lacked substance:

> It used to be not uncommon for the accountant who had been unable to persuade his client to adopt the accounting treatment that he favoured, to urge as a last resort that it was called for by 'accounting principles'. Often he would have had difficulty in defining the 'principle' and saying how, why, and when it became one. But the method was effective, especially in dealing with those (of whom there were many) who regarded accounting as an esoteric but well-established body of learning and chose to bow to its authority rather than display their ignorance of its rules. Obviously, the word 'principle' was an essential part of the technique; 'convention' would have been quite ineffective. (1943, p. 37)

May added:

> It is, perhaps, regrettable that that the word 'principle' should be used to describe canons or procedures to which it can be applied only in a restricted sense. (pp. 39–40)

Storey suggested that discussions about formulating accounting principles into a generally accepted code 'stopped as abruptly as it had begun' (p. 6)—citing the manner in which the American Accounting Association in the latest revision of its 1936 and 1941 statements of 'accounting principles underlying corporate financial statements' had dropped references to 'principles', referring instead to 'concepts and standards' (AAA, 1948). But in post-war years the incoming president of the AICPA A. R. Jennings promoted the funding of research to develop accounting principles (Storey, 1965, pp. 6–7). The Institute subsequently published a series of studies aimed at articulating 'principles', with inconsistent outputs. Grady (1965) compiled an 'inventory' of received wisdom, and listed a series of objectives and associated 'principles' that were expressed as normative statements about how historical cost accounting should be implemented. Sprouse and Moonitz (1962) saw the articulation of 'principles' as a platform for reforming practice (particularly through the abandonment of historical-cost based measurement in favour of the use of replacement cost, and the introduction of general price level adjustments in the calculation of profit). Outside the U.S.A., Chambers was a scathing critic of the Sprouse and Moonitz exercise, principally because of a lack of reasoning to link the stated 'principles' with the prior Moonitz report on postulates of accounting (Moonitz, 1961), and a lack of linkages between the postulates and assertions about the (multiple) objectives of accounting (Chambers, 1964).

These contributions highlighted differing approaches to the meaning and identification of accounting principles—and the purpose of such an exercise. To Grady and others who operated in the context of SEC requirements for financial statements to be prepared in terms of GAAP, 'accounting principles' were a set of propositions that provided the rationale for contemporary practice. To Chambers, one could set out to identify postulates and principles underpinning established practice with an objective in mind—to consider whether those ideas appear to be consistent with 'the facts of life' or 'the requirements of reason'. Alternatively one could build a system of ideas—incorporating statements of postulates and principles—that could then be examined in the light of observation and experience to establish whether they yielded something useful (Chambers, 1964).

In the 1930s, May viewed principles as expressions of what was 'fairly generally accepted' as good practice. During the 1960s, Grady interpreted principles as propositions that reflected a theoretical framework for extant practice, while Sprouse, Moonitz, and Chambers saw principles as propositions that could be derived from postulates, and could establish a rationale for reforming practice. Four decades later, the 'principles versus rules' debate has suggested that technical debate in accounting has come to regard statements of 'principle' somewhat differently to how prior generations have seen them. Now, principles are seen as stand-alone propositions that need not be derived from postulates, or even need not be based on assumptions that are consistent (Alexander and Jermakowicz, 2006). Unlike usage in other disciplines, the term 'principle' need not represent a statement about the behaviour of phenomena that are supported (or is supportable) by observation or other forms of evidence.

Judging from recent commentaries, accounting principles are now commonly regarded as normative statements, either expressing an objective of financial reporting, or a desired qualitative characteristic of the outputs of the accounting process, or even a general statement about accounting treatments that standard-setters propose should be applied, albeit with occasional qualifications or exceptions (see, e.g., Schipper, 2003; Bennett *et al.*, 2006). In this debate, it has been suggested that a *principles-based* regulatory regime relies on the judgment of accounting practitioners, in contrast to a *rules-based* approach that prescribes what practitioners should do in various situations.

Consistent with this theme, contributors to a recent *Abacus* forum suggested that rules by themselves are inadequate—and that some kind of criterion (such as 'true and fair') is essential (Alexander and Jermakowicz, 2006); and that there was a need for a 'true and fair' override to deal with inconsistencies between rules expressed as principles and accompanying guidance (Benston *et al.*, 2006).

In summary, in effect, the term 'principle' is now loosely applied to any general statement about what accountants should do when compiling reports, and which relies (at least in part) on the judgment of practitioners.

Australia's rule that 'reporting entities are to prepare general purpose financial reports' meets both of those criteria. As such it is a worthy candidate for analysis of the claimed advantages of 'principles-based regulation'.

REPORTING ENTITIES ARE TO PREPARE GPFRS—A PRINCIPLE-BASED RULE

A distinction has long been drawn between 'general purpose' and 'special purpose' financial reports (see, e.g., May, 1943, p. 3). So too has the concept of an *accounting entity*—the entity for which accounting records were compiled. The term *reporting entity* is of more recent origin, and has come to refer to the focus of external financial reporting.

It has been claimed by a then staff member of the Australian Accounting Research Foundation that the concept of 'reporting entity' was developed by the Australian Accounting Research Foundation (AARF) as part of its conceptual framework for general purpose financial reporting (Langfield-Smith, 1991, p. 3). The term may have been used even earlier in U.S. literature,[2] but it certainly appeared in a mini-conceptual framework published in 1985 by Australia's Accounting Standards Review Board.[3] The ASRB defined 'reporting entity' solely in the context of the requirements of corporations laws, but foreshadowed an intention to have regard to the commercial and economic consequences of requirements for all companies to have to comply with all standards (a proposition that was contested at the time by representatives of the AARF).

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[2] Ball (1998) refers to the term being used by W. W. Holder in *A Study of Selected Concepts for Government Financial Accounting*, National Council on Governmental Accounting, 1980.

[3] For a history of this exercise, see Walker (1987). The ASRB adopted the following assumption related to the reporting entity: 'the entity for which accounts are prepared in accordance with the requirements of the Companies Act and Codes is a company; group accounts covering a set of companies are prepared to amplify the accounts of the reporting entity, a holding company' (ASRB Release 100 February 1985).

AARF published discussion papers on 'definition of the reporting entity', and on differential reporting (Ball, 1988; McCahey and Ramsay, 1989), together with similarly titled exposure drafts, and finally in 1990 issued Statement of Accounting Concepts SAC 1, *Definition of the Reporting Entity*. SAC 1 contained the following definitions:

> Reporting entities are all entities (including economic entities) in respect of which it is reasonable to expect the existence of users dependent upon general purpose financial reports for information which will be useful to them for making and evaluating decisions about the allocation of scarce resources. (para. 40)
>
> 'general purpose financial report' means a financial report intended to meet the information needs common to users who are unable to command the preparation of reports tailored so as to satisfy, specifically, all of their information needs. (para. 6)

For a time (until 1993), compliance with (all) Statements of Accounting Concepts was said to be mandatory in general purpose financial reports, in terms of the ethical requirements for the accounting profession, as contained in the imaginatively titled Miscellaneous Professional Statement APS 1, *Conformity with Statements of Accounting Concepts and Accounting Standards*, issued jointly by the Australian Society of Accountants (ASCPA) and the Institute of Chartered Accountants in Australia (ICAA) (1990). This stance was somewhat relaxed in 1992, when a revised version of APS 1 stated that 'application of the concepts set out in Statements of Accounting Concepts is mandatory except where there is incompatibility between an Accounting Standard and a Statement of Accounting Concepts, in which case the Accounting Standard prevails' and 'application of the standards set out in Accounting Standards is mandatory'.

In 1991 the Australian Accounting Standards Board issued AASB 1025, *Application of the Reporting Entity Concept and Other Amendments*, which also was applied in 1992. The effect of AASB 1025 was summarized as being to 'relieve companies that are not reporting entities (non-reporting entities) from compliance with other AASB standards in the preparation, presentation and audit of accounts' (Parker and Reilly, 1992).

The professional bodies' stance regarding the need to ensure conformity with SACs was further relaxed in 1993, when a new version of APS 1 described the status of Statements of Accounting Concepts as being regarded as a 'source of guidance' (rather than mandatory) (APS 1, 1993). The current version of APS 1 (1995) contains a virtually identical clause, with amendments either tidying up the language or referring to authoritative statements issued by the profession's then newly established Urgent Issues Group.

However, APS 1 (1995) also incorporates a definition of reporting entity (consistent with that in SAC 1), and requires a 'reporting entity' to prepare a general purpose financial report. APS 1 made plain that it was a responsibility of members of the professional bodies to ensure compliance with this statement.

Some guidance was given, with a list provided of 'types of entities' that would always be identified as 'reporting entities':

> companies whose securities are publicly listed;
> listed trusts and other trusts which raise funds from the public;

> government-controlled business undertakings;
> Federal, State and Territorial governments; and
> local governments.

It was noted that under AASB standards a reporting entity includes 'but is not limited to'

> a listed corporation;
> a borrowing corporation; and
> a company . . . which is a subsidiary of a foreign company [whose securities are publicly traded in Australia].

And it was suggested that 'the following types of entities which operate in the private sector will often not exhibit the characteristic necessary for identification as reporting entities—and hence will often not be required to prepare general purpose financial reports':

> exempt proprietary companies;
> family trusts;
> partnerships;
> sole traders; and
> wholly-owned subsidiaries of Australian reporting entities.[4]

Formally, the effect of APS 1 (1995) was to require members of the profession to ensure the preparation of a GPFR whenever it was 'reasonable to expect the existence of users' who were dependent on GPFRs for information which will be useful to them when making and evaluating decisions about resource allocation. That was a general proposition; it was linked to a conceptual framework, and it did not entirely prescribe what entities were to be regarded as reporting entities, leaving that matter to the judgment of individual members (be they serving as company directors, accountants or auditors).

While AARF had previously sought unsuccessfully to have the 'reporting entity' concept embodied in Australian company laws (see Langfield-Smith, 1991), the same objective was established when the definition of a reporting entity was subsequently repeated in accounting standard AASB 1025, *Application of the Reporting Entity Concept and Other Amendments* (1992), and as such was afforded some legal authority. The principal requirement of AASB 1025 was to restrict application of AASB standards to companies that were reporting entities. That in turn relied on the interpretations of members of the accounting profession.

Accounting standards issued by the profession ('AAS series' standards) already only applied to non-corporate reporting entities. It was suggested that 'the amendment attempts to achieve the SAC 1 objective that companies which are reporting entities must comply with all SACs and accounting standards' (Picker, 1992). It could equally be interpreted as an attempt to reduce the application of legally backed standards to only those entities that were deemed by members of the profession to require the preparation of GPFRs.

Subsequently references to the 'reporting entity' and a definition of that concept were repeated within individual accounting standards. These references, combined with the profession's ethical rules in APS 1 and the 'guidance' set forth in SAC 1, all reinforce the proposition that reporting entities should prepare GPFRs.

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[4] Subsequently the distinction between exempt and non-exempt proprietary companies was dropped, with the introduction of a distinction between small and large proprietary companies in the First Corporate Law Simplification Act, 1995.

This constitutes a classic example of principles-based regulation. And, as shown below, it has been repeatedly disregarded.

The Context in Which the 'Reporting Entity' Rule Was Prescribed

It should be recognized that Australian regulations governing financial reporting are not exclusively encompassed by accounting standards. Rather, contemporary regulatory requirements stem from a range of sources, including the commonwealth Corporations Act, and state-based legislation relating to specific classes of organizations or the conduct of specific activities.

The corporation remains the primary vehicle for economic organization in Australia. Indeed, with 1,427,573 companies registered at June 2005 (ASIC, 2005) and an adult population at that date of around 15.5 million,[5] that represents one company for every eleven adults. In these terms, Australia's use of the corporate form, per capita, is arguably one of the highest (if not *the* highest) in the world.[6]

Fewer than 2,000 of these entities would have their securities publicly traded. The bulk of the remaining companies comprise small proprietary companies (discussed further below).

In conjunction with the use of companies, Australians were known to be operating more than 455,000 trusts in 1999 (ATO, 2001). As there is no requirement to register all trusts, and these figures are somewhat dated, the actual number may now be far greater. Even so, the overall ratio of *one company or trust for every eight Australian adults* seems noteworthy, and presumably reflects the attractions of the lower tax rates applicable to these vehicles, relative to the tax rates imposed on individuals.

The overall framework of reporting rules established by the Corporations Act—the major source of reporting requirements—involves what are (in effect) six sets of disclosure rules (some overlapping). Different rules apply to:

1. disclosing entities;
2. public companies that are not disclosing entities;
3. large proprietary companies;
4. registered schemes;
5. small proprietary companies (in general); and
6. certain small proprietary companies—such as those that have been owned by a foreign company during the financial year; or those that have been directed to publish financial reports by ASIC.

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[5] Data for 'adult population' are based on estimates published by the Australian Bureau of Statistics (June 1995), and assume that 'adults' are persons eighteen years or older—that being the minimum age specified in the Corporations Act for a person capable of acting as a company director.

[6] Comparable figures are: U.K., one for every 21 adults; Germany, one for every 21 adults; U.S.A., one for every 46 adults These estimates are based on data sourced from Companies House (U.K.) 2006 and Office for National Statistics (U.K.), 2006; Federal Statistics Office (Germany), 2006; U.S. Census Bureau, 2005; U.S. Central Intelligence Agency, 2005, and BizStats.com, 2001–05.

However, the enunciation of these six different sets of reporting requirements is not straightforward. It is not possible to go to the statute, look up an index, and find a simple listing of the reporting obligations of different classes of company, or other entity. Rather, one must turn to and fro between different parts of the Act, and review administrative requirements (such as ASIC class orders) and the 'applications' section of each accounting standard, in order to establish the reporting obligations of different classes of company.[7]

The most onerous and extensive reporting requirements apply to 'disclosing entities'. The Corporations Act refers to disclosing entities in the sections that govern the disclosure of information and the placement of information on the public record. The concept of a 'disclosing entity' was introduced into the Corporations Law by the Corporate Reform Act 1994. In effect, a 'disclosing entity' is a body whose securities are of interest to the public. Disclosing entities are not necessarily corporations—they could be unit trusts, or indeed other forms of entity that have issued certain types of securities.

The definition of a 'disclosing entity' hinges on whether any of the securities of the body are so-called ED ('extended disclosure') securities (s. 111AC(1)). A complex definition of ED securities is provided at Part 1.2A of the Act and related regulations. In summary, the following are ED securities: quoted securities (s. 111AE); prospectus-related securities (s. 111AF); securities issued as consideration for a takeover or under a scheme of arrangement (s. 111AG); and debentures, where the borrower is required to appoint a trustee (s. 11AI).

The Act requires 'disclosing entities' to prepare financial statements and reports for half-years as well as full financial years (s. 111AO); to conform with requirements for continuous disclosure, which are different for limited and unlimited liability disclosing entities (ss. 674–675 and s. 11AP); and to comply with certain reduced disclosure requirements for prospectuses (s. 713), which are set out at s. 111AQ. In addition, some accounting standards refer to disclosing entities. For example, AASB 1046 (2004) required only disclosing entities to disclose certain information relevant to executive remuneration.[8]

The next layer of reporting requirements applies to public companies that are not disclosing entities. The Corporations Act requires all public companies to prepare financial reports for each financial year (s. 292). Public companies must also send a copy of the financial report to their members by the earlier of at least twenty-one days before the AGM after the end of the financial year or four months after the financial year end (ss 314–16). The financial reports must also be lodged with ASIC no later than four months after the end of the financial year (s. 319(1)).

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[7] Additional complications for the reader are introduced by references to an 'economic entity', 'closed' groups, 'extended closed groups' and 'holding entities as if they were reporting entities'. See ASIC Class Order 98/1418, 'Financial Reporting Relief for Wholly-Owned Entities'.

[8] S. 300A of the Act requires disclosure of information on director and executive remuneration in the directors' reports of listed companies; AASB 1046 (which had the force of law under s. 296(1)) required disclosure of information in the financial report. To resolve this apparent inconsistency, Regulation 2M.6.04 and Schedule 5B to the Corporations Regulations allowed the transfer of remuneration information required by AASB 1046 to the directors' report. The AASB subsequently replaced AASB 1046 with AASB 124 to operate from 31 December 2005, and ASIC Class Order CO 06/50 replaced the regulation with similar effect, enabling disclosure of remuneration information to be included in the directors' report.

However, the scope and content of those financial statements depends on whether or not they comply with all, or only some, accounting standards—and it is here that the reporting entity rule is of relevance. If a company (in conjunction with its accounting advisers and auditor) determines that it is *not* a reporting entity, then its financial reports need not be GPFRs and need not comply with all applicable accounting standards.

On the face of it, the disclosure requirements for both large and small proprietary companies may seem to reflect a balance—aiding family businesses and other small or medium enterprises to enjoy the benefits of incorporation and limited liability without burdening them with reporting obligations, unless they were operating economically significant enterprises. However, as will be noted below, the statutory requirements incorporate serious anomalies that could have (but have not) been rectified by application of the reporting entity rule.

Large proprietary companies (along with all disclosing entities and public companies) are required to prepare a financial report (and a directors' report) for each financial year (s. 292).[9] A large proprietary company is one that satisfies two out of three of the following criteria (s. 45A):

> The consolidated gross operating revenue for the financial year of the company and any entities it controls is $10m or more.
>
> The value of the consolidated gross assets at the end of the financial year of the company and any entities it controls is $5m or more.
>
> The company and any entities it controls have 50 or more employees at the end of the financial year. (Part-time employees count as an appropriate fraction of a full-time equivalent.)

Conversely a small proprietary company must satisfy two out of three of the following criteria (s. 45A):

> The consolidated gross operating revenue for the financial year of the company and any entities it controls is less than $10m.
>
> The value of the consolidated gross assets at the end of the financial year of the company and any entities it controls is less than $5m.
>
> The company and any entities it controls have fewer than 50 employees at the end of the financial year.

Small proprietary companies are generally excused from having to prepare financial reports or directors' reports (s. 292). However, they may be directed to do so by their shareholders (s. 293) or ASIC (s. 294), or may be required to do so if they have been owned by a foreign company at any stage during the prior financial year (s. 292). Further, small proprietary companies are not required to appoint an auditor unless they have been foreign-owned at some stage during the prior financial year, or have been requested to do so by at least 5 per cent of shareholders (s. 293) or by ASIC (s. 301).

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[9] However, large proprietary companies need not prepare financial statements (s. 292) and lodge them with ASIC (s. 319) if they can demonstrate that they are eligible to gain an exemption under transitional 'grandfathering' provisions (s. 1408). To satisfy these, the company must have been an exempt proprietary company at 30 June 1994; continually met the definition of exempt proprietary company after 30 June 1994; been audited within the reporting deadlines of the law at that time from the 1993 financial year onwards; and lodged notice with the Commission within five months of 9 December 1995 that it wanted the former s. 317B of the law at that time to apply to it.

An anomaly in current regulatory arrangements is that the regulator has no means of assessing compliance with the small proprietary company exemptions from financial disclosure. Prior to 1995, all companies were required to lodge an annual return, including key financial data such as the value of assets, liabilities and equity, along with operating profit and extraordinary items after income tax (Corporations Regulations 1994 r. 3.8.01(r) and (s)). However, the First Corporate Law Simplification Act 1995 removed these items from an annual return. Annual returns were subsequently abolished in their entirety by the Corporations Legislation Amendment Act 2003. They have been replaced by a reporting system involving an Extract of Particulars, which is provided to the company by ASIC and the company then must confirm or correct the information set out in the document, by lodging a Return of Particulars where necessary (ss. 346A–346C). Regulation 2N.2.01 sets out what particulars may be included in an extract. They are largely the same as the Annual Return when it was abolished, but do not include any of the key financial data listed above.

Effectively this means that ASIC cannot know whether proprietary companies have grown from 'small' to 'large'. However, some of these proprietary companies—large or small—could well be reporting entities (a matter discussed below).

The main features of Australia's differential reporting requirements for different types of entities are summarized in an appendix—primarily by reference to the Australian Corporations Act, but with occasional reference to other commonwealth legislation (that encompasses the reporting of pension funds) and state-based legislation (e.g., in relation to reporting requirements for unincorporated associations, such as certain clubs and charities), and to the common law. These requirements establish the context in which Australia's reporting entity rule is being applied.

APPLICATION OF THE REPORTING ENTITY RULE—IN PRACTICE

The focus of most academic discussions of financial reporting is on major corporations. With the exception of some large proprietary companies that (through grandfather clauses in the Corporations Act) are able to escape reporting obligations, most of these are designated in Australia as reporting entities—because they are specifically nominated as such in specific clauses supplementing the statement of principle constituting the reporting entity rule.

But listed corporations represent around 0.1 per cent of Australia's incorporated entities, and an even lesser percentage of the total number of vehicles used to conduct commercial or non-profit operations.

The introduction of the reporting entity rule meant that directors and auditors of other corporations were faced with decisions as to how to interpret the reporting entity rule, and then, what form of financial reporting they were required to undertake. Some guidance was available. Apparently reacting to the issue of AASB 1025 (1991), the Australian Securities Commission issued a media release on how the rule should be interpreted:

> Directors must form a view as to whether they [*sic*] are a reporting entity under AASB 1025. In forming this view, they should be guided by Statement of Accounting Concepts (SAC) 1.
>
> Reporting entities must comply with all applicable Accounting standards under section 298 of the Law and the financial statements must also comply with the prescribed disclosure requirements under section 297 of the Law.
>
> Non-reporting entities' financial statements must also give a true and fair view. In providing this view, the ASC expects directors of non-reporting entities to adopt the accrual basis of accounting in financial statements set out in AASB 1001 (ASC 1992).

Subsequently the ASC somewhat amplified these comments in an Accounting Commentary, with the suggestion that

> Where uncertainty exists, the ASC encourages directors to adopt a conservative approach and release financial statements as a reporting entity (ASC, 1993).

Picker (1992) had suggested that an unequivocal information request from potential users was required before companies could issue 'special purpose reports', suggesting that this could flow from agreements or from specific instructions by the users. Notwithstanding this interpretation, the ASC's media release (and subsequent commentary) may have encouraged the view that the question of whether a company was a reporting entity was a matter for determination by directors. Auditors, in turn, may adopt the stance that they are not in a position to question the judgment of directors.

The ASC's successor, ASIC noted that its review of financial reports had shown 'that some companies which claimed to be non-reporting entities should have been classified as reporting entities' and signalled that it would 'look closely at cases where non-reporting entities have not complied with the recognition and measurement requirements of accounting standards' (ASIC, 2000).

The Institute of Chartered Accountants in Australia subsequently issued a lengthy Business Practice Guide on the preparation of financial statements for non-reporting entities (ICAA, 2004). This guide openly disputed the view expressed by ASIC (2000) that all companies required to prepare financial statements should comply with the measurement requirements of accounting standards (p. 3) 'since the standards are drafted as applying to reporting entities'. However the ICAA claimed that all companies were required to prepare cash flow statements (a proposition that is commonly ignored by practitioners).

There may be confusion over the interpretation and implications of the 'principle' that GPFRs should be prepared for reporting entities, but the fact remains that APS 1 continues to assert that application of the reporting entity rule is a professional responsibility of members of the accounting profession (whether as members of governing bodies or as auditors).

It is also possible to examine how the reporting entity rule has been applied in practice. A major difficulty in such an exercise is that reliance must be placed on information that is available for inspection (and the consequence of the application of the rule is that many entities do not publish financial statements). Nevertheless, four instances of this application are briefly outlined below. They relate to a range of industries or entities (some incorporated, some not):

1. trustees of superannuation funds;
2. operators of residential aged care facilities;
3. managers of registered investment schemes; and
4. charities.

(1) Trustees of Superannuation Funds

The trustees of superannuation funds are responsible for the overall management of funds that represent savings of the majority of Australians. Total consolidated assets of Australian managed funds institutions were $1,027.5 billion at 30 June 2006, of which $544,710 billion was attributable to superannuation funds (ABS, June 2006).

The Commonwealth Government's requirements for compulsory employer contributions to pension funds have meant that the funds under management by Australian superannuation schemes have continued to grow. The recent introduction of 'choice of fund' has seen trustees undertaking extensive advertising to encourage employees to nominate individual funds as the repository for their retirement savings.

However, there do not appear to be any requirements for the trustees of superannuation funds to operate through the vehicle of a public company (or even to be operated through an incorporated entity). Even if they are established as public companies, then trustees may self-describe themselves as 'non-reporting entities', and hence conclude that they are not required to prepare GPFRs, or to comply with all relevant accounting standards. In the 1980s the former National Companies and Securities Commission required corporate trustees to show the assets and liabilities of trusts in their balance sheets (with an associated 'right of indemnity') (see NCSC, 1986). It appears that this crude rule was aimed at trading trusts rather then superannuation funds; even so, had this rule been maintained it may have ensured that most corporate trustees would meet the criteria for classification as a 'large' proprietary company. But this attempt to ensure that major trusts were subject to some form of disclosure rules was later abandoned by the ASIC (1999).

The following illustrates how trustees of superannuation funds may self-describe themselves as non-reporting entities:

UniSuper is a $15 billion industry superannuation fund (2005 data) with a membership drawn from university employees (both academic and general staff). The trustee of this fund is UniSuper Trustees Limited, a public company. The 2005 accounts of this entity show assets of $37 and issued capital of $37.

UniSuper Trustees is not a 'disclosing entity' and as such was not obliged to comply with those accounting standards requiring the disclosure of executive remuneration.

Further, because directors chose to regard UniSuper Trustees as a non-reporting entity, it's 2005 financial statements did not comply with accounting standards applicable to GPFRs, notably AASB 1017, AASB 1024 and AASB 1026 relating to the disclosure of related party transactions, the preparation of statements of cash flows, and consolidated statements, respectively. A wholly owned subsidiary of UniSuper Trustees was UniSuper Management Pty Limited, an entity which provided administration and funds management services to the trustees. All directors of the trustee company are directors of UniSuper Management. It was the latter entity that remunerated directors, senior executives, and employed an extensive workforce. Rather than being recorded as a subsidiary of the trustee company, UniSuper Management Pty Limited was regarded as an investment of the fund.

The overall effect of the application of the reporting entity rule and the consequential limited application of accounting standards meant that this entity did not disclose information commonly regarded as basic to accountability.

As noted above, the Australian accounting profession's statement of professional responsibilities in APS 1 (1995) supplements the definition of a reporting entity by providing guidance in the form of a list of types of entities that would always be identified as reporting entities. The list includes listed trusts and other trusts which raise funds from the public.

The industry superannuation fund may not have raised money from the public—only from more than 360,000 current or former employees in a particular industry. If the trustees determined that this fund was not a reporting entity on that basis, it is a stark illustration of how principles-based rules will be interpreted narrowly even when they are supplemented by 'guidance'. But incorporated trustees are separate from the fund they administer. Possibly directors of the trustee company argued that while the fund was a reporting entity, the trustee company was not.

The same hair-splitting distinctions could well be adopted by trustees of many other industry superannuation funds (or, indeed, master trusts operated by private sector wealth management businesses).

Moreover, on the face of it, there is a remarkable gap in regulatory arrangements, since they do not require the same standard of disclosure regarding directors' benefits and executive remuneration that have long been imposed on listed companies—some with a market capitalization that is counted in millions of dollars, not the billions of dollars held by superannuation funds. This gap could be filled (at least in part) by accounting professionals (be they directors or auditors) insisting that trustees of pension funds be regarded as reporting entities, and as such comply with accounting standards, particularly those requiring disclosure of related party transactions.

(2) Operators of Residential Aged Care Facilities

With an ageing population, the provision of residential aged care facilities has become increasingly important in Australia. This also is a major issue elsewhere in the world. Providers of these services include private 'for profit', religious, charitable and community institutions, and state or local governments. Some operators manage single facilities, while others run national chains.

Funding for these facilities largely comes from recurrent government subsidies, calculated per resident bed day, and resident daily care fees and accommodation charges. The Federal government has also provided capital funding. Some operators require residents to purchase apartments that are re-sold when they leave or die (with the investor only receiving a percentage of the proceeds).

Organizations that operate aged care facilities in tandem with retirement villages—many of them charitable or church-controlled operations—may demand that prospective residents provide accommodation bonds, some as much as $1 million. In terms of the Commonwealth Aged Care Act 1997, the operator is not required to pay interest on these bonds, which become a cheap source of finance. Moreover, the operators are currently empowered to withhold 5 per cent of these bonds per annum, so long as the resident is in occupation. The Act provides (s. 57) that the income derived from the accommodation bond and the retention amount must be applied to meet capital works relating to residential care, retire debt relating to residential care, or 'improve the quality and range of aged care services'.

The accounting practices within the industry were subject to scrutiny in the course of a recent claim for wage increases from the N.S.W. Nurses' Association, a union representing registered nurses, enrolled nurses and assistants in nursing (Nursing Homes &c., Nurses' (State) Award, Re (No. 2), *[2005] NSWIRComm88*). In proceedings before the New South Wales Industrial Relations Commission, operators resisted the claim on the basis of 'capacity to pay'—claiming that wages increases were not affordable, and supporting that contention with evidence from a selection of operators. This opened the door for an examination of the accounts of those operators. While these materials were provided on a confidential basis, some general observations can be made. Most operators were from the not-for-profit sector, and were either small or large proprietary companies. Notes to the financial statements of several of these asserted that directors had determined that the company was not a reporting entity; accordingly the accounts were 'special purpose financial reports'. In one case, a company that reported as if it was a small proprietary company appeared to meet the criteria for a large proprietary company—but had not changed its reporting practices. Some not-for-profit operators were operating as trusts, and trustees had similarly 'determined that the Trust is not a reporting entity'.

Given that the operators had not prepared GPFRs they were not obliged to comply with accounting standards. A common feature of the accounts of the 'for profit' operators was that the sums withheld from accommodation bonds had not been reported as revenues; in many cases these amounts were credited to 'reserves'. In other cases these amounts were described as non-operating income. The effect was to understate significantly their financial performance.

The larger operators were controlled by charitable or church organizations. Some of these established separate entities to operate retirement villages and the less profitable nursing facilities, but did not prepare consolidated statements depicting the overall financial results of these service entities.

The broader point is that whenever residents had contributed accommodation bonds, it seems reasonable to suppose that there is a class of stakeholders (residents or their relatives) who were unable to command the presentation of special purpose reports explaining the stewardship of those funds.[10] Because the operators were not 'reporting entities', they were not subject to the discipline of having to provide cash flow statements which would show whether and in what manner the sums withheld from accommodation bonds had been applied.

Application of the reporting entity rule would have seen the universal preparation of GPFRs. This did not occur.[11]

(3) 'Responsible Entities' of Managed Investment Schemes

At 30 June 2006, $279,069 billion was held by Australian managed funds (ABS, Cat. 5655.0, June 2006). This sum would include funds raised by managed investment schemes, most of which are structured as public unit trusts (Moodie and Ramsay, 2003).

ASIC's consumer protection website has suggested that some managed investment schemes have been 'among Australia's worst investments':

> Nurses, retired people, professionals, church groups, ethnic communities and even police have lost hundreds of millions of dollars over the past ten years by investing in these schemes.

In 1991 the then Commonwealth Attorney-General initiated a review of the legal framework for collective investment schemes by the Law Reform Commission. The product of this review took the form of proposed legislative amendments requiring managed investment schemes to be registered, and for the prior structure of a 'management company' and a 'trustee' to be combined by the identification of a single 'responsible entity' (see Parliamentary Library, 1997). This was intended to avoid uncertainty as to which party was ultimately accountable to scheme investors (Moodie and Ramsay, 2003).

Financial statements must be prepared for the *schemes* (see Appendix). But while the 'responsible entities' of these schemes must be public companies (Corporations Act, s. 601), must themselves prepare annual financial statements and (notionally at least) must comply with (at least some) accounting standards, they may not be regarded as 'reporting entities' in terms of those standards.

Consequently the operators of registered schemes may avoid providing basic information that would enable investors to assess the ongoing financial viability of the operators. There have been instances where these managed investment schemes (notably agricultural schemes) have failed, arguably because of the inability of the manager to continue to provide management services after that company disbursed substantial sums to its directors and staff (who were, in effect, the promoters of the schemes). Arguably, fuller disclosure would have warned investors and enabled them to initiate actions to protect their investments.

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[10] Further, given that the revenues of the operators of adjacent nursing homes were largely derived from taxpayers' contributions, the failure to compile and lodge GPFRs meant that government scrutiny of the profitability of the aged care industry was restricted. A recent government review of the industry was compelled to obtain data on a confidential basis via a survey administered by one of the Big 4 accounting firms. The report did not recognize the impact of diverse accounting treatments of revenues from accommodation bonds; rather, it claimed that an independent audit of the data undertaken by a second Big 4 accounting firm confirmed that 'all relevant forms and associated instructions' in the survey instrument 'complied with standard accounting practices and standards' (p. 306). The Report discloses that the survey responses, once compiled, had been shredded. See Hogan (2004).

[11] It is understood that searches of company records failed to locate the financial statements of the parent entity for a major chain of residential aged care facilities. Possibly the parent was a trading trust, or a large proprietary company that enjoyed exemptions from disclosure because of grandfather provisions applying to former exempt proprietary companies.

The fact that the Corporations Act requires that the responsible entities of managed investment schemes should be *public* companies suggests that those who framed the legislation had in mind that those managers would be compelled to file detailed financial information about their affairs on the public record. They may also have assumed that the application of the reporting entity rule by the accounting profession would have ensured that full disclosure would occur.

Current arrangements rely on a form of prudential regulation. Responsible entities are required to obtain a licence to operate a managed investment scheme, and to do so must satisfy ASIC that they meet certain mandatory net tangible asset requirements, and have sufficient liquid assets to ensure continued operation of the scheme (ASIC Policy Statement 131, 2000). ASIC statistics indicated that at 31 January 2001 there were 454 (licensed) responsible entities in Australia, operating 2,530 registered schemes (Moodie and Ramsay, 2003, p. 8).

However, the presence of these requirements has not averted the high-profile collapse of some Australian property trusts (part of the Westpoint 'group'). ASIC successfully sought a court declaration that these were appropriately described as investment schemes (*Australian Securities & Investments Commission v. Emu Brewery Mezzanine Ltd* [2004] WASC 241)—though they were unregistered. Based on preliminary reports from receivers and other commentary, it appears that these investment schemes sought funds from investors via $2 companies rather than licensed responsible entities.[12]

Moreover, the extensive regulations currently in place still do not enable present or prospective investors or their advisers to independently assess the viability of the manager and the scheme's capacity to sustain operations of the scheme. Rules requiring 'responsible entities' to be reporting entities and so prepare audited GPFRs would not avert investor losses, but by requiring the involvement of independent auditors they could impose greater discipline on fringe operators in the securities market.

(4) Charities

Official data show that there are around 45,600 charitable bodies registered with the Australian Taxation Office for income tax exemption and/or Deductible Gift Recipient (DGR) status (ATO, 2003).

There are two reasons for suggesting that charities should be regarded as reporting entities. First, because they enjoy the benefits of corporate income tax concessions and relief from fringe benefits tax, their operations are effectively supported by taxpayers—and as such should be accountable for the way they utilize those benefits.[13] Second, donors are entitled to expect that the operations of the organizations to whom they have contributed resources should be open and transparent. Of particular concern to many donors is the extent to which their contributions are absorbed by collectors' commissions and administrative costs. Yet the accounting profession's reporting entity rule in SAC 1 (1990) or APS (1995) was not accompanied by suggestions that charities would be reporting entities; nor during the past decade have Commonwealth regulatory agencies, or the major accounting bodies, promulgated that interpretation.[14]

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[12] Receivers and managers, KordaMentha, provide a table associating a series of proprietary companies as associated with individual property trusts or syndicates. http://kordamentha.com/wespoint/info/creditor.aspx. Accessed September 2006. For a description of fund-raising arrangements, see *Australian Securities and Investments Commission, in the matter of Richstar Enterprises Pty Ltd (CAN 099 071 968) v Carey (No. 3) [2006]* FCA 433, 20 April 2006.

Many smaller charities operate as small proprietary companies, or trusts, or as unincorporated associations. As such, they are not obliged to place any financial information on the public record. Yet they may solicit donations via street appeals, door knocking, emails, letters or telephone calls. Major charities may publish abridged statements on their websites, or provide financial statements on request. A sample of reports downloaded from websites revealed that several publish 'special purpose reports', some claiming that these were prepared in terms of state-based legislation.[15]

The main way that charities are held accountable is through state-based fundraising legislation (e.g., the Charitable Fundraising Act 1991 (N.S.W.) and Fundraising Appeals Act 1998 (Victoria)). To illustrate, the New South Wales legislation refers to 'fundraising appeals' as the soliciting or receiving by a person of any money, property or other benefit if, before or in the course of doing so, the person represents that the purpose of the soliciting or receiving is or includes a charitable purpose (s. 5(1)). 'Charitable purpose' is defined in broader terms than the general law to include a benevolent, philanthropic or patriotic purpose (s. 4(1)). Some religious bodies are exempt from the Act. A person or organization desiring to conduct a particular appeal, or fundraising appeals generally, should apply to the minister in the approved form for an authority to do so (s. 14). It is an offence for a fundraising appeal to occur without an authority under the Act (s. 6), or in contravention of a condition attached to an authority (s. 10), and to participate in or promote a fundraising appeal not conducted lawfully (s. 12(1)). The Act requires a person or organization conducting a fundraising appeal to keep, as prescribed, records of income and expenditure in relations to each appeal

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[13] The Australian Commonwealth Treasury Department publishes an annual *Tax Expenditures Statement* that provides details of the concessions, benefits and incentives delivered to taxpayers through the tax system. In the latest publication, of the 270 'tax expenditures' identified, 'deductions for gifts to approved donees' was valued at $630 million, the exemption for public benevolent institutions from fringe benefits tax was valued at $250 million, while the value of income tax exemptions for charities and related institutions was not estimated (Commonwealth Treasury, 2005). Possibly this was due to the lack of available data.

[14] A publication in the ICAA's journal *Charter* canvassed the possibility that charities should be regarded as reporting entities, in the context of the then-imminent application of International Financial Reporting Standards in Australia (Archer, 2004).

[15] For example, reports of the Association of Child Welfare Agencies Inc., The McKusker Foundation for Alzheimer's Disease Research Inc., Florey Research Fund.

(s. 22(1)), and requires an authorized fundraiser to send, at such intervals identified in the authority, to the minister returns giving the prescribed details of any appeals conducted by it since the last return was lodged (s. 23(1–3). The details that must be provided are the gross amounts from each appeal, the net amount received after the deduction of expenses, and the application of the proceeds (s. 21(1)). Further, section 24(1) requires an authorized fundraiser to have their accounts, in so far as they relate to the receipts and expenditure connected with fundraising appeals, audited annually by a qualified person. Regulation 11 also requires authorized fundraisers to provide audited financial statements concerning fundraising appeals conducted during the post recent financial year to anyone who requests them on payment of a prescribed fee (Regulation 11).

While the N.S.W. Act is considered to be one of the strongest in Australia, questions have been asked about the extent of compliance with these requirements (Walsh, 1998). While the NSW Act does not require the preparation of GPFRs, showing how the resources accumulated from (say) bequests, investment earnings on accumulated assets have been applied, in 2002 the government agency oversighting fundraising activities emphasized that

> A charity which undertakes fundraising from the public will become a reporting entity because there will exist potential resource providers who require general purpose financial reports as a basis for making resource allocation decisions. (NSW DGR, 2002)

It also suggested that some 'branches' of charities may operate locally and as such should be regarded as reporting entities.

Given that this agency was in a position to provide advice as to whether proposed fundraising appeals should receive ministerial approval, this strong interpretation of the accounting profession's rules appears to have substantially influenced reporting practices within the state (while auditors had apparently remained silent). It was noted, for example, that one major charity (the Salvation Army) that formerly produced unconsolidated sets of accounts for individual 'funds' or 'trusts' has commenced producing a GPFR.

While charitable corporations are subject to the modest accountability requirements in the Corporations Act 2001, the accountability requirements relating to trusts and unincorporated associations are significantly weaker. Trust law has particularly vague and weak requirements for accountability and disclosure. Similarly, unincorporated associations are subject to little or no formal process of accountability. On the face of it, if charities were regarded as reporting entities, and were producing GPFRs complying with accounting standards, the standard of accountability in this sector would be enhanced. Outside New South Wales, some incorporated charities continue to be deemed 'non-reporting entities' by the accounting professionals that prepare their financial statements or undertake audits.

CONCLUDING OBSERVATIONS AND SOME OPTIONS FOR REFORM

It is argued that the above four examples reflect a failure of accounting professionals to ensure appropriate observance of the reporting entity rule. The cases examined here constitute evidence that contradict claims about the alleged superiority of principles-based accounting standards versus rule-based standards.

Why is this so? It is recognized that the reporting entity rule is drafted as a general proposition, accompanied by detailed guidance as to what entities are 'always' reporting entities, and what 'may not' be reporting entities. There may be nothing wrong with such an approach to the drafting of rules, since it is not possible to predict what forms of commercial vehicles may emerge in the future. Arguably a 'principles-based' rule, accompanied by accompanying specifications of the minimum application of that rule, provides both clarity and the capacity for that rule to have application in new situations.

However, the success of a principles-based rule would seem to depend upon the willingness of auditors to ensure compliance. It would also depend on the capacity of regulators to monitor levels of compliance, and the willingness of regulators to take enforcement action where the rule has been ignored or disregarded. From the evidence and argument above, both seem to have been lacking in Australia.

An alternative interpretation is that reliance on a principles-based rule is doomed to fail—and that hence there is a need to bolster Australia's disclosure requirements with additional or redrafted rules.

It would certainly be possible to point to anomalies in those arrangements. Focusing on matters canvassed above, the following piecemeal changes might be considered:

- extending the list of entities described in SAC 1 and in APS 1 as 'always being reporting entities' to encompass trustees of superannuation funds, and responsible entities of managed investment schemes, and to operators of aged care facilities that require intending residents to lodge accommodation bonds or purchase residential units for later resale;
- extending the application of section 300A of the Corporations Act (which requires disclosures relating to directors' and executive remuneration and benefits[16]) beyond *listed companies* to encompass a range of other entities—notably trustees of superannuation funds, or the responsible entities of managed investment schemes;

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[16] Section 300A was introduced by the Company Law Review Act 1998, and introduced new disclosure requirements for companies listed on the Australian Stock Exchange that are also incorporated in Australia. The section requires the directors' report for a financial year to include a discussion of board policy for determining the nature and amount of remuneration of board members and senior managers of the company; a discussion of the relationship between such policy and the company's performance; and details of the nature and amount of each element of the remuneration of each director and each of the five named executives of the company receiving the highest remuneration. The Corporate Law Economic Reform Program (Audit Reform and Corporate Disclosure) Act 2004 amended s. 300A to require additional disclosure, including details of elements of remuneration dependent on the satisfaction of performance conditions and further details of options forming part of remuneration. This Act also introduced several other changes regarding remuneration. At the annual general meeting of a listed company the chair must allow a reasonable opportunity for the members as a whole to ask questions about, or make comments on, the directors' remuneration report prepared pursuant to s. 300(1) (s. 250S). Further, a resolution that the directors' remuneration report be adopted must be put to the vote (s. 250R(2)). The vote on the resolution is advisory only and does not bind the directors or the company (s. 250R(3)).

- re-instating requirements for every company to lodge with ASIC the financial information previously required for annual returns (rather than the current 'statement of particulars') so that the regulator would be in a position to administer the Corporations Act by identifying whether corporations are 'large' or 'small' proprietary companies. This would require the annual return (or re-specified 'extract of particulars') to include information about turnover, number of staff, and the aggregate value of assets.

Broader (but still piecemeal) amendments might:

- transfer the 'reporting entity' rule to the Corporations Act and re-draft it as a formal rule stating that reporting entities include a list of corporations engaged in (specified activities)—a list that would be more extensive than that in SAC 1 and AUS 1.

More contentious may be proposals for the concept of reporting entity to be extended to encompass:

- major employers—say, any firm (or even divisions of a business[17]) that employs more than a specified number of persons. (The notion that employees are stakeholders is already accepted in one of the three tests in the Corporations Act for determining whether a proprietary company is large or small. ASIC [2000] asserted that companies 'with a significant number of . . . employees' should have been classified as reporting entities. No record of any attempt by ASIC to enforce this interpretation has been identified.)
- recipients of government grants or subsidies above a certain dollar value;
- all entities that enjoy the status of charities or public benevolent institutions, or otherwise are exempt from corporate income tax.

However, such proposals would only relate to incorporated bodies—not to other vehicles such as trusts or unincorporated associations. The anomalies described in this article suggest a need for a broader review of regulatory arrangements. Indeed, there has been recognition of such a need for some time. A government post-implementation review of the changes in regulatory arrangements in the financial sector observed that 'superannuation, particularly required attention to reduce the opaqueness of the industry through enhanced disclosure and education' (Financial Sector Advisory Council, 2004). A government review of residential aged care observed that 'financial accountability and reporting in the sector is generally undeveloped' (Hogan, 2004, para. 203). Subsequently the Commonwealth Government introduced new prudential standards for the handling of accommodation bonds by operators of aged care facilities.[18] A review of charitable organizations in Australia suggested that all charities be required to incorporate under the then Corporations Law, that sector-specific accounting standards be introduced to achieve comparability and reduce costs of charities preparing multiple reports for different funding bodies, and that a Charities Commission be established to supervise the sector (Industry Commission, 1995). And, as noted above, a N.S.W. government agency announced in 2002 that charities that raised funds through public appeals should be regarded as reporting entities; it also suggested that individual branches of charities should be regarded as separate reporting entities if they undertook autonomous appeals.

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[17] The IASB may be considering such an approach having regard to an employee's interest in collective bargaining. It has recorded that 'what constitutes an entity for financial reporting purposes should not be limited to legal entities. Rather, an entity can result from other types of arrangements or organizational structures that could be broadly described as circumscribed areas of economic interest. Examples include a company, trust, partnership, association, sole proprietorship, natural person and, in some circumstances, a branch or segment' (IASB, Current Projects, September 2006).

[18] See Parliament of Australia, Parliamentary Library, Bills Digest 85 2005–06.

All of these suggestions focus on specific industries. A more fundamental review of regulatory arrangements would seek to harmonize concepts and hence standardize disclosure and accountability requirements, regardless of the form of vehicle in use. There are good reasons to establish differential reporting requirements—so that, for example, a listed public company is expected to disclose more information than a small proprietary company. But arguably, the same approach could be extended to encompass the accountability requirements established for unincorporated vehicles. Possibly one approach would be for all jurisdictions to adopt a common reporting code for unincorporated entities—as was the case during the 1980s when the Commonwealth and the States established a Co-Operative. Scheme for the regulation of companies and securities matters.

But—to look beyond gaps, shortcomings or inconsistencies in Australian regulatory arrangements—perhaps claims about the merits of 'principles-based rules' should not be taken too seriously. The surrounding rhetoric may be appealing: 'a principles-based approach to regulation focuses on outcomes rather than processes' (FSAC, 2004). In substance, such rhetoric may be interpreted as a claim for industry-self-regulation rather than government-imposed regulation—a claim that would relieve practitioners of enforceable obligations and would allow many commercial or not-for-profit vehicles to avoid accountability to stakeholders and the broader community.

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APPENDIX

MAIN FEATURES OF AUSTRALIA'S DIFFERENTIAL DISCLOSURE REQUIREMENTS

Type of entity	Annual financial and directors' report	Half-yearly financial and directors' report	Continuous disclosure	Extract of particulars	Comment
Disclosing entities	Yes (s. 292)	Yes (s. 302)	Yes (ss 674–5); depends if listed or not	Yes (s. 346C)	
Listed public companies (disclosing entity—s. 111AE)	Yes (s. 292)	Yes (s. 302)	Yes (s. 674)	Yes (s. 346C)	Directors' report must include: disclosure on non-audit services, auditor independence (s. 300(11B–E)) and remuneration information (s. 300A)
Borrowers (disclosing entities—ss 111AE–AF)	Yes (s. 92)	Yes (s. 302)	Yes (ss 674–5); depends if listed or not	Yes (s. 346C)	
Listed trusts (as registered schemes)	Yes (s. 292)	No (s. 302)	Yes (s. 674)	Yes (s. 346C)	Trusts have a common law duty to account
Superannuation funds					
—assets less than $50 million	No	No	No	No	Disclosure is to APRA and the authority is granted to APRA to set reporting standards by s. 13 of Financial Sector [Collection of Data] Act 2001
—assets equal to and greater than $50 million	No	(Quarterly reporting to regulator)			Differing disclosures required for funds with assets less than $50 million, or equal to or greater than $50 million
Unlisted public companies	Yes (s. 292)	No	Yes (s. 675)	Yes (s. 346C)	
Unlisted public companies acting as trustee for superannuation funds	Yes (s. 292)	No	Yes (s. 675)	Yes (s. 346C)	Trustee Statement which refers to the level of compliance with prudential and regulatory requirements and the accuracy of information given. S. 13 of Financial Sector (Collection of Data) Act 2001

Large proprietary companies	Yes (s. 292)	No	No	Yes (s. 346C)	
'Exempt' large proprietary companies	No (exempted by s. 1408)	No	No	Yes (s. 346C)	
Small proprietary companies	No; unless directed by shareholders or ASIC or if owned by a foreign company (ss 292–4)	No	No	Yes (s. 346C)	Trustee Statement which refers to the level of compliance with prudential and regulatory requirements and the accuracy of information given. S. 13 of Financial Sector (Collection of Data) Act 2001
Unlisted trusts attracting public investment (as registered schemes)	Yes (s. 292)	No (s. 302)	Yes (ss 674–5)	Yes (s. 346C)	
Unlisted trusts operating as charities	Yes, as registered scheme (s. 292)	No	No	Yes (s. 346C)	Charitable fundraising report to minister (s. 23 of Charitable Fundraising Act 1991 (N.S.W.)). Information to be included in fundraising reports includes the gross amounts from each appeal, the net amount received after the deduction of expenses, and the application of the proceeds (s. 21(1))
Unincorporated associations, e.g., clubs	No	No	No	No	Disclosure to members based on constitution and common law
Incorporated associations	No	No	No	No	Annual report to be lodged with the Director General (s. 26—N.S.W. Associations Incorporations Act 1984)
Charitable company (limited by guarantee)	Yes (s. 292)	No	No	Yes (s. 346C)	Charitable fundraising report to minister (s. 23 of Charitable Fundraising Act 1991 (N.S.W.)) (see above)
Registered schemes (defined managed investment scheme registered under s. 601EB)	Yes (s. 292)	If a Disclosing Entity—yes; otherwise no (s. 302)	If a Disclosing Entity—yes; otherwise no (ss 674–5)	Yes (s. 346C)	

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The Rise and Fall of William Bassett Chinnery

The purpose of this article is to explain how William Bassett Chinnery, who was appointed Agent for New South Wales on 1 May 1787, was enabled to embezzle more than £80,000 of Treasury funds prior to his dismissal on 17 March 1812. In this chronicle attention is concentrated on Chinnery's duties and peculation rather than his private life and his love of music which has been exposed elsewhere (Yim, 2004). Attention is paid to accounting and control systems used at the British Treasury and the function and operation of the Audit Office which was established in 1785. In conclusion, it is argued that Chinnery was able to avoid detection because contemporary charge and discharge reporting, cash control and auditing were inadequate.

Key words: Accounting, charge, discharge; Audit Office; Chinnery; Embezzlement; Treasury.

PATRONAGE: A PATHWAY TO POWER

During the reign of George III the rise, if not the fall, of well-connected and ambitious men such as William Bassett Chinnery (hereafter WBC) was not uncommon. The reign, which spanned two generations (1760–1820), provided unprecedented opportunities for young country gentlemen who were willing to leave their families and move to London or to seemingly remote outposts overseas. During the reign Britain's navy and army were engaged in three major conflicts, but no matter whether Britain was at war or peace, the merchants of England and Scotland were reaching out all over the world in their unremitting search for profits. Ambitious families used whatever connections they could muster to secure the patronage of parliamentarians or directors of trading companies.

WBC was born in 1766, the eldest surviving son of a writing master who secured the patronage of Edward Thurlow, the Lord Chancellor. Thurlow, who was appointed Lord Chancellor in 1778, presided over the House of Lords throughout the remainder of Lord North's Tory administration. Thurlow maintained his position

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as the highest officer of the Crown even when the Whigs, led by the Marquis of Rockingham (March 1782–July 1782) and his successor the Earl of Shelburne (July 1782–February 1783), held power. It seems that Thurlow, while having no wish to marry his companion Mrs Harvey, was determined that their daughters become well-educated and he entrusted this task to WBC's father (Gore-Browne, 1953, p. 290; Conner, 1993, p. 18).

While his siblings, John, Frances and George, were to leave England to find their fortune in the East, Thurlow's patronage enabled WBC to find his at home. At first, Thurlow found him a place in his office as his private secretary. Later, in February 1783, an opening occurred at the Treasury. George Rose, one of two secretaries in this, the most powerful of all the departments, in deference to the Lord Chancellor, recommended WBC's appointment as junior clerk at a salary of £100 a year (*Parl. Deb.*, Vol. 22, col. 193; T29/53 p. 183).[1]

In December 1783, William Pitt replaced the then Prime Minister, the Duke of Portland, and offered the woolsack to Thurlow. To George Rose, he offered the position of Senior Secretary of the Treasury. Rose was to become the Prime Minister's 'intimate friend and faithful follower. Pitt found his industry and remarkable ability in finance extremely useful, employing him largely as a means of communicating with others, and specially in matters of patronage which were included in Rose's sphere of official duty' (*DNB*, Vol. 17, p. 227). Similarly, over the following four or five years, WBC impressed George Rose with his ingenuity and attention to duty and Rose awaited an opportunity to reward his favourite clerk (*Parl. Deb.*, Vol. 22, col. 193).

1787: AGENT FOR NEW SOUTH WALES

An opportunity for rewarding WBC became apparent in 1786 when, following the loss of the North American colonies, the British government sought another destination for the petty criminals whom judges had sentenced to transportation. The government considered a number of places as the ultimate destination of its felons. In addition to the need to establish a penal colony, other factors were taken into account and each destination was found to have advantages and disadvantages. The government decided that Botany Bay in New South Wales, which Captain Cook had entered in 1770, was the best place to establish a penal society, even though the cost of its operation was seen to be greater than other locations closer to home.

On 19 April 1787 George Rose presented to the House of Commons the estimate of the cost of the Civil Establishment in New South Wales for the year ended 10 October 1787. The Civil Establishment numbered twelve men, all of whom except the Agent were required to be located in New South Wales. The House was advised that, owing to the 'peculiar Situation of that Settlement', salaries amounting to £2,677 10s. were to be paid in advance (*JHC*, Vol. 42, p. 650). Given that the First Fleet was nearly ready to set sail for Botany Bay, there was an urgent need to appoint an Agent so that the officers of the Civil Establishment might be paid before departure.

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[1] The article uses standard references which are identified in the References section.

George Rose handed the position to WBC. Consequently, WBC at the age of twenty-one was appointed Agent for New South Wales 'by Warrant under His Majesty's Royal Sign Manual Dated the 1 May 1787' (AO1/1295/438). The appointment proved timely as the First Fleet departed from Portsmouth on 13 May 1787.

PRIVATE BANK ACCOUNTS AND CONTROL BY SURETY

The provision to pay in advance the salaries for the year ended 10 October 1787 was exceptional. The general rule adopted for colonial officers required that salaries were to be paid to each officer's agent upon the production of a certificate signed by the Governor 'of their being in execution of their duty' (T29/117/634). In general this did not occur until some months after the money allocation had been approved by parliament. In the meantime, long-established Treasury practice enabled an Agent to draw the full amount of money voted by parliament and deposit it in a private account.

The practice of permitting agents to hold public money in their hands rather than in a Bank of England account enabled them to 'speculate in land or the stock market', too often with an adverse outcome (Roseveare, 1969, p. 125). Parliament had sought to implement a better system. In 1782 and 1783 they passed Acts that curtailed the practice in the army (22 Geo. III c. 81; 23 Geo. III c. 50). The Acts were passed in response to the reports of the commissioners appointed to examine the public accounts.

Prior to the passage of the Acts, while in office army paymasters were permitted to hold large sums of money in their private accounts. They were also permitted, after they left office, to hold unspent cash until such time as the auditors of the imprest examined their final account. The audit might be delayed twenty years or more. Henceforth the Acts required that all money voted for the army must be held in an account at the Bank of England. Furthermore, a report showing the balance of the account was to be forwarded to the Treasury every month, while each paymaster was required to submit an annual account for audit.

No such controls were placed on colonial agents. In an attempt to ensure that colonial agents did not misappropriate Treasury funds, they were required to provide sureties. WBC's sureties were Alexander Davidson and John Fenwick who each agreed to pay a penalty of £1,000 if WBC broke his bond (T1/3535/16484; TS2/5/465–6). Alexander Davidson was one of the contractors who supplied clothing, tools and other items that were shipped to New South Wales (Bladen, 1893, Vol. 2, p. 40). The surety requirement not only offered an insurance against defalcation, but also ensured that preferred appointments were reserved for those who were connected to wealthy members of society.

AUDIT ACT: CHARGE AND DISCHARGE ACCOUNTING

Under the requirements of the Audit Act of 1785, colonial agents and other nominated accountants responsible for a particular service were required to submit an annual charge and discharge account to the Audit Office Board. A charge and discharge account is simply a statement showing the amounts and sources of money received and amounts and purposes for which money was expended, that is, a statement of receipts and expenditure. The charges might also include amounts claimed as discharges in the previous period that were disallowed by the auditors.[2]

The charge and discharge method probably had its roots in the feudal system that developed in England after the Norman Conquest (Littleton, 1933, p. 123). While the method 'had its usefulness' (Littleton, 1933, p. 126) it did not, as will be shown, 'provide a check against embezzlement' (Pollard, 1968, p. 246).

The Audit Office Board was not empowered to audit Treasury accounts other than those specified by the Act. Its efficacy was further limited because it reported to the Treasury and not to parliament. This limitation was brought to the attention of parliament in 1810. Henry Bankes, a long-standing member who chaired the Committee on the Public Expenditure, suggested that reports prepared by the Audit Office should be 'under the cognizance of Parliament' rather than being 'strictly subject to the control of the Treasury' (*BPP*, 1810 (371) II. 388, 389).

1789: THE FIRST ACCOUNTS AND TEMPTATION

The first account WBC submitted to the Audit Office was declared on 11 July 1789. The account showed the amount impressed, that is, the charge or the amount received, and the amounts paid in cash, the discharge. The amount voted by parliament for the year ended 10 October 1787 comprised £2,677 10s. for salaries and £200 for other expenses. The entries in WBC's account for the year ended 10 October 1787 were not dated and there is no indication as to when WBC drew cash from the Exchequer or when the salaries were paid either to the civil officers or their London agents. The various discharges could have occurred in 1788 or even as late as the first half of 1789. The declared balance of cash in WBC's hands at the end of the period was less than £400. Given that WBC's sureties totalled £2,000, then as far as the Treasury and the Audit Office were concerned, the surplus balance was secure in his hands.

Contrary to the explanation presented to parliament by George Rose, it seems unlikely that the Civil Establishment salaries for the year ended 10 October 1787 were paid in advance because WBC did not draw the £2,877 10s. until 9 July 1787, that is, two months after the First Fleet set sail (*BPP*, 1812–13 (233) XIII. 101). While it is possible that the salaries for 1787 were paid to agents of Governor Phillip and the other members of the Civil Establishment before the year's end, the same cannot be assumed for the following year. For the year ended 10 October 1788 parliament again voted £2,877 10s. for the Civil Establishment of New South Wales. The cash, which was provided on 4 August 1788, again exceeded the cash that was subsequently paid out. According to the charge and discharge account WBC at year-end, that is 10 October 1788, held a little more than £1,000 of public money in his private account. However, there can be no doubt that the actual balance in WBC's hands was more than £3,000 because the Governor could not sign the necessary certificates before 10 October 1788 and months would elapse before the delivery of the certificates to WBC in London. It is clear that the charge and discharge account for the year ended 10 October 1788 included salary payments that were not made until well after the end of period date. On 29 July 1789, nearly twelve months after the £2,877 10s. had been received by WBC, the agent for Andrew Miller, the NSW Commissary, complained to Evan Nepean, the Under-Secretary of State for the Home Department, that 'Mr Chinnery informs me that he cannot pay it without I can produce the Governor's Certificate that he is living & in the Execution of the Office' (CO201/4/138). WBC's conduct was not improper. WBC had no way of knowing if Miller were alive, and in execution of his duty, or dead. In fact Miller's health was declining and in April 1790 the command of the Commissariat was passed over to John Palmer. Some months later he died on a return journey to home.

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[2] A number of secondary sources that treat charge and discharge can be found in *Accounting, Business and Financial History*, March 1994.

The significance of this analysis must not be overlooked. It shows that the balance of a charge and discharge account was a 'book figure', which did not necessarily represent balance of cash in an accountant's hands at the end of a period. The system permitted payments occurring after balance dates to be included and shown as if they occurred prior to balance dates.

For the year ended 10 October 1789, parliament again voted £2,877 10s. This was less than the amount shown as discharges. This was due to salaries for three officers whose payments were not shown in the previous year's account. At year-end, while the book balance in WBC's hands was £633, the actual amount was again probably more than £3,000 given that WBC drew the £2,877 10s. on 3 September 1789 (*BPP*, 1812–13 (233) XIII. 101) and that the required Governor's certificates could not be forwarded until after 10 October 1789.

OPPORTUNITY TO FLY A KITE

With hindsight it is clear that WBC, a young man in his early twenties, would be tempted to invest the Treasury funds in his custody. Given the distance, the Governor's certificates from New South Wales would always be received many months after year-end and possibly not before the next year's funds were made available to WBC. Thereby WBC could 'fly a kite', that is, he could misappropriate one year's funds by delaying payment to the members of the Civil Establishment until the next year's funds were in his hands.

In August 1792, WBC was appointed Receiver of Fees of Suppressed Offices. The suppressed offices comprised the Departments of the Lord Chamberlain, Lord Steward, Master of the Horse, Master of the Robes and the Four Tellers of the Exchequer. While the position does not seem to have increased WBC's salary it did require the lodgement of two £1,000 sureties. The reward for the additional duties was to be gained from the use of the cash from the time it was received from the suppressed offices until he was required to make a transfer into the Exchequer. The previous incumbent was Thomas Cotton, a chief clerk who was appointed, some years later, to the position of Auditor. One account submitted by Cotton to the Treasury Board shows that he received more than £25,000 over a four and half year period (T1/676/91–6). The net amount after deducting charges was paid into the Exchequer. WBC did not follow the example of his predecessor, preferring to hold a considerable balance of accumulated fees in his private account. Unfortunately for the public, the Receiver of Fees of Suppressed Offices was not required to submit an annual account for external audit. As a consequence, WBC as Receiver was not subjected to an annual review until 1805, when the Treasury Board determined that all accountants must submit annual accounts.

In January 1794 WBC's income received another boost. The Treasury Board entrusted him with further funds by appointing him Agent for the Bahama Islands at an additional salary of £150 per annum. It seems that WBC was still a favoured son of the Treasury at this time. The annual estimate for the Bahama Islands' Civil Establishment in 1794 was £4,250. Two more sureties of £1,000 provided protection against loss due to embezzlement.

1795: UNEASE AT THE AUDIT OFFICE

In contrast to the attitude of the Treasury Board, the officers of the Audit Office Board in the mid-1790s were clearly unimpressed by WBC's performance. In his role as Agent for New South Wales his accounts for the three years ended 10 October 1790, 1791 and 1792 had been lodged but not declared. The Inspector General in the Audit Office advised WBC on 13 May 1795 that in response to his failure 'to answer the observations and queries on your account as Agent for New South Wales' for the year ended 10 October 1791 that his account would be surcharged (AO7/10/364).

The surcharges amounted to nearly £500. Surcharges arose when auditors found amounts paid by an accountant that were unauthorized, or not supported by adequate documentation. An accountant was expected to attend promptly to such an unsatisfactory state of affairs. However, in the absence of a requirement that accountants must return to the Exchequer cash equal to the surcharges, the action open to the auditors had no teeth. Even so, they were empowered to report unsatisfactory performance to the Treasury Board. The Audit Office Board did not make such a report at this time. However, they did draw the Lords' attention to the waste and the potential danger of the excessive cash balance in WBC's hands. In a letter dated 10 July 1795 the Audit Office Board advised the Lords Commissioners of His Majesty's Treasury that the balance of his New South Wales account at 10 October 1792 was £5,306 18s. 5½d. and that 'you may either direct so much of the said sum as you think proper to be paid by Mr Chinnery into the Exchequer, or applied towards the expence of the settlement of New South Wales for the ensuing year' (AO7/11/47).

Yet the report to the Treasury Board was not timely. It dealt with the book balance as at 10 October 1792. It did not state exactly how much cash WBC held in July 1795. The Treasury Board had no basis on which to calculate the amount that WBC should return to the Exchequer, or alternatively, by how much the estimate for the year ended 10 October 1796 should be reduced. As a consequence, WBC's control, and possibly private use, of more than £5,000 of public money was unfettered.

On 28 April 1796 the Audit Office Board requested WBC to inform them regarding the amounts that had been saved on expenses for the period 10 October

1786 to 10 October 1793 (AO7/11/276). The outcome of this investigation enabled the Audit Office Board to advise the Treasury Board that WBC held £1,692 2s. 10d. that under no circumstances could he be called on to pay (AO7/12/130).

The Treasury Board had anticipated the advice of the Audit Office Board and only half the annual estimate for the year ended 10 October 1796 was paid to WBC on 15 August 1796. The balance was paid on 31 May 1797 (*BPP*, 1812–13 (233) XIII. 101).

1799: PROMOTION TO CHIEF CLERK

While the Audit Office sought to minimize the balance in WBC's hands and was critical of WBC's performance, it seems that the Treasury Board found his performance satisfactory. In July 1798 WBC was promoted to Senior Clerk (T29/73/209), and in January 1799 to Chief Clerk (T29/74/64), a position he held until his dismissal. Sainty (1972, p. 34) found that chief clerks 'in addition to their own particular responsibilities acted in a general advisory capacity to the Board'. In the 1790s the Treasury Board comprised five senior members of the government of the day, including the Prime Minister who was First Lord of the Treasury and Chancellor of the Exchequer.

The attitude of the Audit Office to WBC did not change after he was promoted to Chief Clerk. In March 1800 the Inspector General demanded that WBC submit his New South Wales accounts for 1797 and 1798 'duly attested on oath before a Baron . . . on or before Tuesday the 22 April next' (AO7/15/397–8). The Inspector General in February 1801 again reminded WBC about his ongoing failure to submit his accounts in a timely manner: 'the Board are sorry to recollect the necessity you frequently impose upon them, of repeatedly pressing for the regular delivery of your accounts' (AO7/16/339).

1801: COMPLAINT FROM NEW SOUTH WALES

In April 1801 the incoming Governor of New South Wales, Philip Gidley King, found inordinate delays in the payment of some members of the Civil Establishment. The Governor in a letter dated 10 April 1801 complained that Martin Timms, a superintendent of convicts at Norfolk Island since July 1793, had 'never been paid'. The Governor made clear in this letter to WBC that he was the person responsible for the non-payment: 'You are the person on whom those Bills are to be drawn, by the Duke of Portland's directions, and not the Treasury' (*HRA*, Ser. 1, Vol. 3, p. 86). The Governor also noted the financial advantage accorded the Agent for New South Wales: 'You have of course received the Sums long before these Bills can possibly come to your hands' (*HRA*, Ser. 1, Vol. 3, p. 88). Governor King, in May 1802, took a step to facilitate the payment of the Civil Establishment, and incidentally to reduce the period over which WBC held money allocated by parliament. He advised WBC that 'a List of the Officers on the Civil Establishment of this Colony . . . will be sent by every opportunity that may offer on or after 10 October and 10 April annually' (*HRA*, Ser. 1, Vol. 3, p. 518).

1805: DISQUIET AT THE AUDIT OFFICE

In March 1805 the Audit Office Board had sufficient information regarding WBC's New South Wales' account to make an estimate of the amount of accumulated savings in WBC's hands as at 10 October 1799. Initially they calculated that the amount was in excess of £7,000. After receiving a response from WBC, they agreed that the amount of savings was £2,300 and recommended that the amount 'be applied towards the expences of the Civil Establishment of New South Wales for the Current year, or paid into the receipt of His Majesty's Exchequer' (AO8/2/191).

The lack of control at this time might be attributed to the dramatic increase in the workload of the officers of the Treasury and the Audit Office. This increase was due to the relatively high levels of expenditure needed to sustain the war against Napoleon. During the war the incumbent Chancellor of the Exchequer astonished 'the House of Commons with the announcement that some £455 million of expenditure remained officially unaccounted for' (Roseveare, 1969, p. 134). Clearly, the amount of cash in WBC's hands was insignificant compared to the huge sums expended by the army and the navy. It is not surprising that the attention of the Treasury Board and the Audit Office Board was not concentrated in his direction.

In August 1805 the Treasury Board at last took a decisive step to control those who handled public money. They directed that all accountants, internal and external, who held public money must submit an annual account for examination by the Treasury Board (T29/90/316). While it took some time to enforce the Board's directive, it was inevitable that sooner or later WBC would be called upon to submit his outstanding accounts.

In March 1806 the Audit Office Board once again drew the attention of the Treasury Lords to their repeated requests for submission of WBC's accounts and the excess balances in his hands. The board was clearly dissatisfied with WBC's performance. On 19 March 1806 they advised the Treasury that 'according to his own statement, he appears to be indebted the sum of £12,660 18s. 6¾d.' as at 10 October 1800 and 'that you may, if you think proper, direct the said sum, or any part thereof, to be applied for the expence of that Colony for the present year' (AO8/2/365). This time the Treasury took some action and WBC was directed to pay nearly £5,500 into the Exchequer (AO8/3/178).

1807: DISQUIET AT THE TREASURY

In May 1807 the Treasury Board nominated two senior members of the Treasury, George Harrison, the Assistant Secretary, and Thomas Cotton, the senior Chief Clerk, to examine annual accounts that were now required to be submitted in a timely manner (T29/90/317). It seems that Harrison and Cotton, in their capacities as the Treasury's internal auditors, turned their attention to WBC. He was required to make up an account as Agent for New South Wales for the year ended 31 December 1806, notwithstanding that his annual accounts for the previous five years had yet to be declared. This extraordinary account was declared on 6 February 1808 and WBC was required to return £2,500 to the Exchequer. Within a year, all of WBC's outstanding accounts for New South Wales accounts were declared. WBC was now in compliance and submitting his annual account for New South Wales in a timely manner. Unfortunately for WBC, the timely submission enabled the Audit Office Board and the Treasury Board to be cognisant of the growing balance of cash in his hands.

1807: ACTION AT THE AUDIT OFFICE

On 11 November 1807, the Audit Office Board, in an eleven page letter to the Treasury Board, evaluated the colonial funding and accounting systems and the performance of WBC as Agent for New South Wales and the Bahama Islands (AO8/5/197–207). They found that £12,705 was voted for the Civil Establishment of New South Wales for the year 1807 and that under normal circumstances WBC was entitled to request this amount from the Exchequer. They questioned implicitly the wisdom of approving a full transfer from the Exchequer to WBC. They pointed out that 'Mr Chinnery's payments have never exceeded for any one Year the Sum of £11,000' and that the average amount over the last six years was 'little more than £5,000' per annum (AO8/5/200). They found that the balance accumulated by WBC was 'in a much greater degree, than in any other Colonial Service' and that the 'distance of the Settlement of New South Wales and the difficulty of communication with this country, sufficiently accounts for the great amount of these Balances' (AO8/5/201). The Board recommended that WBC be directed to pay a further £8,000 into the Exchequer either from the amount in his hands or from the current annual appropriation (AO8/5/202).

The Audit Office Board then proposed the adoption of a new system for the determination of the amount that should be transferred to each colonial agent. They pointed out that delays in submitting annual charge and discharge accounts negated the usefulness of such accounts for the determination of how much should be transferred to an agent to meet immediate needs. They suggested that colonial agents 'be directed to present annual memorials to your Lordships specifying the amount of the Balances in their hands & praying issues of money founded upon estimates of the probable demands of the Service for the Year' (AO8/5/205).

The reluctance of the Treasury Board to take sufficient action regarding the excessive balances in WBC's hands did not deter the Audit Office Board. In their annual report to the Treasury dated 23 March 1808, they again drew attention to WBC and his accounts (*BPP*, 1810 (371) II. 433). The Board criticized the practice of issuing to colonial agents the whole of the annual amount granted by parliament without inquiring as to the need for such advances to be made. In May 1808, the Treasury Board took some heed of the auditors' advice. They amended the amount requested of parliament to meet bills of exchange issued in New South Wales. This money to meet bills issued in New South Wales was in addition to the amount provided each year to WBC as the Agent responsible for the payment of salaries. The Treasury Board estimated that the amount of bills drawn, or to be drawn, from New South Wales during the course of the year 1808 was £25,000. From this sum they deducted £10,580, being savings on this grant for the year 1807, and requested an advance of the net amount only (*JHC*, Vol. 63, p. 850). This estimate was approved by parliament together with an appropriation of £13,583 4s. 2d. to meet the salaries of the Civil Establishment.

In July 1808 the Secretary of the Treasury, Henry Wellesley, sought to make the Audit Board responsible for the amount to be advanced to WBC. He asked the Audit Office Board to pass an opinion on WBC's request to draw the full amount of the estimate for the year ending 31 December 1808. On 26 August the Audit Office Board, in response, presented the Treasury Board with a number of options, all of which provided for the issue of a lesser sum to WBC than the parliamentary estimate (AO8/6/269–71). Their first option was to advance only £4,500 because they wished to withhold from WBC 'the disallowances or surcharges made during a series of many years by the late and present Board' (AO8/6/270–1). In so doing they sought to 'give the accountant a strong interest in taking immediate measures for removing' the surcharges (AO8/6/270–1).

1808: ACTION AT THE TREASURY

The softest option presented by the Audit Office Board was to deduct only the accumulated salary and other savings totalling £2,417 17s. 11d. from the 1808 estimate. The Treasury Board chose not to penalize WBC, but took the soft option and authorized WBC to draw £11,165 6s. 3d. from the Exchequer, which he did on 10 September (*BPP*, 1812–13 (233) XIII. 102). It is possible that in August 1808 WBC did not have under his command sufficient ready money with which to pay salaries amounting to £7,000 for the New South Wales Civil Establishment for the previous year. If this is so, then the Treasury Board's favourable decision provided a respite, and the day of reckoning was put off until another year.

In 1809 the amounts voted by parliament for New South Wales and the Bahama Islands were £15,134 10s. and £4,900 respectively (*Parl. Deb.*, Vol. 17, cols. xxix–xxx). The Treasury Board authorized WBC to draw only £1,900 on account of the Bahama Islands Civil Establishment, yet permitted him to draw the full amount of the New South Wales estimate (AO1/1248/36; AO1/1295/458).

WBC must have been very concerned by the inquiries being made by the Committee on the Public Expenditure which in April 1810 presented the second part of their Fifth Report to parliament. This part of the report, entitled 'Audit of Public Accounts', comprised an evaluation of the existing accounting and auditing systems and an appendix containing information and reports extracted from the Treasury's confidential files (1810 (371) II. 381). Two items in the appendix provided members of parliament with information about the unsatisfactory state of WBC's accounts. Appendix item 21 reproduced the annual report of the Audit Office Board for the year ended 31 December 1807 for parliamentary scrutiny. The report addressed to the Treasury Board specifically mentioned the excess balances in WBC's hands on account of the Bahama Islands and New South Wales. Appendix item 37(D) provided details of various amounts issued to WBC for other purposes such as the payment of Treasury salaries and printing costs. For each line item, the report showed whether or not the internal auditors, Harrison and Cotton, had completed their examinations. In a number of instances they had not.

The Treasury Board was unwilling to authorize the payment of the amount voted by parliament for the Civil Establishments in New South Wales and the Bahama Islands for the year ended 31 December 1810. On 25 July they requested the Audit Office to express an opinion on the propriety of issuing the funds to WBC. In regard to the £13,268 15s. provided for New South Wales they advised: 'it appears to us that the sum voted and now applied for by Mr Chinnery may without impropriety be issued to him' (AO8/8/212). They justified their opinion on the grounds that they accepted a statement made by WBC that he was liable to pay more than £20,000 from the accumulated cash balance in his hands.

1810: ROSE SMELLS AND PRIME MINISTER REACTS

The favourable opinions of the Audit Office were received at a time when others sensed a likelihood of there being a deficiency in WBC's funds. This perception of WBC's state of affairs was brought to the attention of Spencer Perceval, the Prime Minister, by George Rose who served as Vice-President of the Board of Trade and Treasurer of the Navy in Perceval's government. Some time in 1810, George Rose expressed his concern about WBC's lifestyle to the Prime Minister. He also wrote a letter to WBC in which he advised the Chief Clerk that those who 'are entrusted with the care or expenditure of public money' must conduct their expenditure in a manner that does not attract the attention of 'well-meaning' or 'impertinent persons' (Harcourt, 1860, Vol. 2, p. 487). He informed WBC that he had discussed the subject with Mr Perceval. He advised WBC to see the Prime Minister and 'satisfy him that you are not in the course of expenditure which may render it unsafe to continue to place public monies in your hands' (Harcourt, 1860, Vol. 2, p. 488). It is clear from Rose's letter that he had been concerned about the state of WBC's financial affairs for a long time and that he had previously 'found himself compelled to remonstrate with' WBC about his 'style of living' (Harcourt, 1860, Vol. 2, p. 488).

On 20 September 1810 the Prime Minister responded in writing to Rose's letter. He advised Rose that he had spoken to WBC and he had 'no apprehension of the public being exposed to any risk from the amount of balances in his hands' (Harcourt, 1860, Vol. 2, p. 489). He noted that the Commissioners for Audit had found 'nothing unfavourable in the least degree to Mr Chinnery in the state of his accounts, and no improper accumulation of balance in his hands'. Furthermore he had satisfied himself 'on the fairness of his account as a public accountant' (Harcourt, 1860, Vol. 2, pp. 488–9). The Prime Minister felt that he did not 'have any right to quarrel with him for anything in his style of living' nor 'to try him with any great minuteness as to the source from whence he has derived his pecuniary means of supporting such expense' (Harcourt, 1860, Vol. 2, p. 490). He accepted WBC's claim that he had independent means of support. Even so, he was 'not quite satisfied' regarding the security of the balances entrusted to WBC because the funds, according to WBC's explanations, had been placed 'upon private security' (Harcourt, 1860, Vol. 2, p. 490). The Prime Minister demanded that any future sums received by WBC 'be vested in Exchequer Bills, and so kept till called for' (Harcourt, 1860, Vol. 2, p. 490). He advised Rose that 'it is not fitting, that the public security should rest on his or on any man's word'. He stated an intention to establish a general regulation which required the Treasury to take 'an estimate of the largest amount of balance, which the agent has in his hands at any period of the year' and 'to require him to give security to that amount' (Harcourt, 1860, Vol. 2, p. 491).

1811: KEEPING THE KITE ALOFT

Extant evidence does not permit a definitive reconstruction of WBC's financial activities from the beginning of January 1811 until his dismissal in March 1812. Even so, the Treasury's internal auditors, Harrison and Cotton, had been alerted by the Prime Minister and it seems likely that they kept an eye on WBC's financial dealings and attempted to restrict the sources from which WBC could draw cash. For example, in March 1811 WBC was made responsible for £25,000 provided by parliament for 'rebuilding the Public Edifices in the Island of Trinidad which were destroyed by Fire in 1808' (T1/1283/11446). In this case WBC was permitted to draw only £3,000 out of the Exchequer to meet expected fees. The remainder was in the hands of the Exchequer at the time he was dismissed (T29/116/261). Nor did another source of cash provide an opportunity for WBC to use the funds as he wished. In 1811 he was responsible for paying the contractors who managed the hulks at Portsmouth and Woolwich. If the contractors demanded payment as soon as their accounts were passed by the Treasury Board, then there was scant opportunity for WBC to draw the funds from the Exchequer and use them for any other purpose. An account prepared by Harrison and Cotton after WBC's dismissal showed that he had managed to retain only £1,864 of £86,676 issued for this service (T1/1284/13996).

The picture is clearer in regard to the amounts WBC received in 1811 to meet bills of exchange drawn in New South Wales. A detailed statement drawn up by Harrison and Cotton in September 1812 showed that the Treasury failed to control adequately the issue of cash to WBC on this account (T1/3535/4481). Over the year 1811 WBC drew £80,696. The amount was paid in ten instalments, the last payment of £3,000 being made on 23 November. At this time WBC had paid out no more than £72,059 to meet 201 bills. The auditors could have discovered this state of affairs and recommended that the £3,000 be withheld until such time as WBC could show that he had exhausted the £77,696 issued previously.

On 19 July 1811 the Treasury Board requested the Audit Office Board to furnish an opinion on the propriety of issuing to WBC the amounts voted for New South Wales and the Bahama Islands. The Audit Office Board responded on 9 August. They gave consideration to the balance of WBC's 'Account Current' as at 31 December 1810, the amount of surcharges and the demands for payments that were likely to be made in the current year. They concluded that only £5,000 of the £13,308 15s. estimate for New South Wales ought to be transferred to WBC. Even so, they calculated the balance in WBC's hands would be in excess of £21,000 (AO8/9/172, 200).

On the same day that the Audit Office Board advised the Treasury to severely restrict the amount of cash that WBC could draw, WBC expressed his concern to his wife. At the time he was involved in a dispute over loans that he had made with the broking house of Abraham Goldsmid whose principal had committed suicide in September 1810. He did not want to disclose his problems with Goldsmid because it might 'bring on a more general one' that might affect his 'well-being'. He was concerned that there might be 'a recurrence to events of last year when Mr Rose so ungenerously spoke and wrote to Mr Perceval' (PHM: 94/143/1–7/2). A week later WBC drew the £5,000 allowed to him by the Treasury on the advice of the Audit Office Board (*BPP*, 1812–13 (233) XIII. 102).

As the year 1811 neared its end so too did the rise of WBC. On 19 December WBC wrote to his wife and informed her that he had been questioned about bills drawn in New South Wales: 'I fear that the alarm has been sounded, & that all is lost'. He attributed his problems to losses he had made on loans including a 'loss of the nearly twelve thousand pounds one way or the other at the time of the loan in 1802 after the peace . . . was the commencement of my real misfortunes' (PHM: 94/143/1–7/2). He also suggested that the insolvency and subsequent suicide of the financier Abraham Goldsmid prevented him from recovering loans he had made to Goldsmid's firm.

1812: DISAPPEARANCE, DISMISSAL AND DENOUEMENT

In March 1812 WBC acknowledged that his time was up. Ships from New South Wales were expected to arrive in the near future. One or more of these ships would deliver the Governor's despatches and bills drawn on WBC's private account for the payment of salaries of members of the Civil Establishment, as well as those drawn on the Treasury to cover other expenses. If he accepted a bill then he had to ensure either that there was a sufficient balance in his private account at Messrs Drummond to meet payment, or that the bankers would grant a temporary overdraft. WBC made a crucial decision. His credit at his bankers was nearly exhausted. Even so, relying on Messrs Drummond to meet payment to an important client, he accepted a bill payable to Admiral Bligh and declined to accept a perfectly regular bill drawn by the New South Wales Commissary in favour of a Norfolk Island superintendent. WBC also declined to accept several other bills on the grounds that they were irregular (T29/116/263).

On Monday, 9 March, WBC sent his family 'a few lines from the Treasury' saying that 'a discovery was unavoidable and that a few days would decide his fate' (PHM: 94/143/1–10). A week later his wife Margaret recorded in her diary that WBC had gone into hiding and Yim (2004, p. 161) found that 'he did what most debtors then did, and fled to the continent'.

Prior to his disappearance, WBC at the behest of the Treasury Board submitted a very full affidavit that set down at length a statement of 'his debt and insolvency' (TS2/5/468). The Prime Minister and Chancellor of the Exchequer, Spencer Perceval, advised the Treasury Board on 17 March 'according to Mr Chinnery's Own Account very considerable Balances appear to be due from him to the Public & far exceeding any means which he possessed of liquidating the same' and that he had directed the Treasury Solicitor 'to take such measures as might in his opinion be most efficacious to secure for the benefit of the Public whatever property Mr Chinnery might be possessed of, available in liquidation of his Balances' (T29/116/221–2). The Treasury Board agreed that WBC be dismissed immediately and the Treasury Solicitor moved quickly in an attempt to secure control over WBC's assets.

The Treasury auditors, Harrison and Cotton, also were called to action. Their role was to investigate and determine the state of affairs of each fund that had been entrusted to WBC. Over the following twelve months they presented more than fifteen reports to the Treasury Board. On 20 March 1812, Harrison made a preliminary report to the Treasury Board regarding the state of WBC's accounts (T29/116/261–3). The internal auditor advised 'that Bills drawn upon Mr Chinnery on account of salaries of officers at New South Wales and the Bahama Islands have been accepted by him payable at Messrs Drummonds' and that they were due to be presented in a few days (T29/116/261). He also provided information on the seven irregular bills totalling nearly £800 and the regular bill for £50 payable to Robert Jones, the Norfolk Island superintendent. The Treasury Board was aware that the bills would be dishonoured because the Treasury Solicitor on 17 March had advised WBC's bankers of his insolvency and demanded that no more bills be paid that would cause his account to go into overdraft (TS5/3/232). The Treasury Board did not think that dishonouring the bills would be 'proper or expedient' and directed that sufficient funds be provided from the army extraordinaries to meet these bills.

WBC's defalcation was brought to the notice of the House of Lords on 23 March 1812 by Earl Grosvenor. Without mentioning WBC by name, Earl Grosvenor stated that the person was a protégé of George Rose and that Rose's eyes should have been opened. He asked the Secretary of State for information; in so doing he noted that the defalcation 'was not less than £70,000'.

Two days later in the House of Commons, Henry Bankes, the chairman of the Committee on the Public Expenditure, brought WBC's peculation to the attention of the lower house. He suggested that 'accounts ought to be oftener examined' and 'recommended the adoption of some means of preventing in future the accumulation of frauds on the public' (*Parl. Deb.*, Vol. 22, cols 195, 192). The Prime Minister's response and that of George Rose were frank and provided a limited summation of the extant Treasury systems of accounting and auditing, and their concern regarding WBC's alleged extravagant lifestyle. The Prime Minister stated that in future 'the clerks should be audited every quarter', and that,

> the accounts of Mr Chinnery have been of such a nature, that by balancing the surplus of some years against the deficiencies of others, the appearance of the whole was so fair, that it was a matter of little surprise that the auditors had been deceived. The inaccuracies in them could only be detected by looking to the accounts for a considerable time back. These back accounts had been neglected; but latterly, an effort had been made to get them into a more regular and proper train. As there were a great many of these accounts to look to, it was a considerable time before the accounts of Mr Chinnery were hunted,

> as it were, into such a corner, that it was hardly possible for the defaulter to escape. He did not deny that some blame attached itself to those whose duty it was to look to the accounts, but still he contended, that to detect the defaulter was very difficult, from the nature of the accounts. (*Parl. Deb.*, Vol. 22, cc. 192–3)

George Rose stated that in the 1780s, WBC had been,

> very ingenious, and at the same time attentive to his duty. For four or five years Mr Chinnery appeared to go on very well, but after that time he got into an extravagant way of living, which he (Mr Rose) thought ill became his situation. He remonstrated with him on the subject. . . . he replied that he was enabled to do so by the support of other funds than those with which he (Mr R.) was acquainted. . . . When he (Mr R.) was in the Treasury, 14 or 15 years ago, Mr Chinnery, in consequence of a[nother] remonstrance, assured him that the world were much mistaken in his circumstances, as he had other resources than he was generally known to possess. From that period, he (Mr R.) had ceased to speak to him frequently; and had indeed very seldom spoke to him since. About a year and a half ago, he saw Mr Chinnery was still going on in the same extravagant manner. . . . for 14 or 15 years Mr Chinnery had been in the habit of giving concerts, which were attended by performers of the first celebrity. . . . He knew persons of great consideration who were in the habit of attending these concerts, but he had never gone to one, lest he should seem to give his sanction to such doings. . . . When a Bill was brought in two years ago by the hon. Baronet opposite, he had endeavoured to frame it to meet cases like the present, and he thought at that time that if he could be laid hold of, Mr Chinnery might be the first affected by that Bill. (*Parl. Deb.*, Vol. 22, cc. 192–3)

The legislation referred to by George Rose was entitled 'An Act for more effectually preventing the Embezzlement of Money or Securities for Money belonging to the Public, by any Collector, Receiver, or other Person entrusted with the Receipt, Care or Management thereof' (50 Geo. III, c. 59). The Act which was proclaimed on 9 June 1810 provided that convicted persons 'shall be sentenced to be transported beyond the Sea'. The possibility of transportation to the land for which he had so long been the agent and accountant must have been in WBC's mind when confronted by Spencer Perceval and no doubt provided the impetus for his flight to Gothenburg which enabled him to avoid prosecution.

On 28 April 1812 the Parliamentary Committee on the Public Expenditure called on the Audit Office to submit a summary statement of any representations made to the Treasury in 1807 and 1808 in regard 'to the Money voted by Parliament for New South Wales & of the balance in Mr Chinnery's hands' (AO8/10/2–3). The auditors responded by forwarding copies of their letters to the Treasury dated 11 November 1807, 26 August and 2 December 1808 in which they expressed their concern about the funding and accounting systems and the balances in the hands of WBC (AO8/10/3). Given the contents of these and other earlier letters, it seems reasonable to conclude that the Audit Office was blameless. Over a period of many years they had consistently drawn the attention of the Treasury to the generally unfettered issue to WBC of amounts voted by parliament. Furthermore, the Audit Office was privy only to WBC's accounts for the Civil Establishments of New South Wales and the Bahama Islands. In contrast, the Treasury Board had access not only to the Audit Office reports and WBC's colonial accounts, but also to accounts and statements prepared by WBC and their internal auditors, Harrison and Cotton, on the balances of other funds held by WBC.

The Treasury Board left it to Harrison and Cotton to establish the state of affairs of each fund controlled by WBC. Similarly, the Treasury Solicitor was allocated the task of realizing WBC's assets which included Gillwell Park (Yim, 2004, p. 163). The reconstruction and closing of most of WBC's accounts was completed before the year was out. In May 1813 the Treasury presented a report to parliament on the state of WBC's 'balance due to the public' (*BPP*, 1812–13, (186) XIII. 89). The report contained details of amounts received by WBC on account of forty-two services for which he was made responsible between 1787 and 1812. Except for the amount outstanding on account of bills drawn in New South Wales, the Treasury was able to determine the balance indebted or in surplusage on each service. In total, the Treasury estimated that WBC's net debt was approximately £88,000, this amount including the outstanding balances in WBC's hands as at 31 December 1810 on account of the Civil Establishments in New South Wales and the Bahama Islands. These balances were £24,885 8s. 1¼d. and £3,801 2s. 2d., respectively. The deficiency on the New South Wales account was only surpassed by the £24,976 2s. 8½d. in fees from the suppressed offices that WBC had not passed on to the Exchequer. In respect of bills drawn in New South Wales, a final account was prepared by Harrison and Cotton in September 1812. The account showed that in 1811, WBC was charged with receiving £80,500 which he used to meet bills of exchange and fees totalling slightly more than £73,000 (T1/3535/4481).

The realization of WBC's assets also took time. While the major tasks were completed and reported by 1815, the final report on the Treasury Solicitor's actions was not presented until August 1826 (T1/3535/16484). In December 1815, the Treasury Solicitor presented his bill of costs (T1/3535). The length of this document provided an indication of the amount of time and effort required to realize WBC's assets and to deal with other associated legal matters. The bill of costs comprised more than seventy pages of expense items incurred from 16 March 1812 to 2 December 1815.

In August 1826, the Treasury Board received the final report on the realization of WBC's assets (T1/3535/16484). The net amount recovered was £27,054 10s. 5d. leaving a deficit on all WBC's accounts of nearly £60,000.

CONCLUSION

William Bassett Chinnery's peculation was enabled because the extant accounting and auditing systems provided an opportunity for accountants to use public money for private advantage. The cash control system adopted by the Treasury was flawed. Treasury practice permitted an accountant to hold funds in private banks, such as Messrs Drummond, rather than in the Bank of England where the funds might be subject to regular scrutiny by the Audit Office. The Treasury Board relied on sureties and honourable behaviour to ensure that public funds held in private accounts were secure. WBC's peculation showed that sureties and social position did not ensure that money would not be embezzled. The system offered the advantage of keeping funds derived from or provided for a particular service in an easily identifiable account. The disadvantage *vis-à-vis* a consolidated account was that the funds were not available to the Treasury.

The charge and discharge system of reporting required by the Treasury and the Audit Office did not meet the needs of the time. The omission of transaction dates in the accounts did not enable parties who were privy to the accounts to compile an accurate view of the timing of cash inflows and outflows and to become aware that the accountant was in a position to fly an undetected kite. The omission of dates also enabled an accountant to include transactions such as the payment of salaries in an account, even though they might have occurred many months after the closing date. Furthermore, the charge and discharge system gave no indication of the amounts that would have to be paid in the short and long term, nor amounts impressed but not required to be paid at all.

In general, the performance of the Audit Office was admirable. They were not overawed by WBC's position at the Treasury or by his networks that included members of the Royal Family and the somewhat estranged George Rose. The efficacy of their reports on the performance of WBC and regarding the over issue of funds on a regular basis was restricted because they were required by the Act of 1785 to report to the Treasury Board rather than parliament. In contrast, the internal auditors and the Treasury Board failed. They waited too long to take positive steps despite their awareness that WBC was living beyond his means and that he was entrusted with thousands of pounds of public money that was beyond the scrutiny of the Audit Office.

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The Determinants of the Price Impact of Block Trades: Further Evidence

This article extends previous literature which examines the determinants of the price impact of block trades on the Australian Stock Exchange. As previous literature suggests that liquidity exhibits intraday patterns, we introduce time of day dummy variables to explore time dependencies in price impact. Following theoretical developments in previous literature, the explanatory power of the bid–ask spread, a lagged cumulative stock return variable and a refined measure of market returns are also examined. The model estimated explains approximately 29 per cent of the variation in price impact. Block trades executed in the first hour of trading experience the greatest price impact, while market conditions, lagged stock returns and bid–ask spreads are positively related to price impact. The bid–ask spread provides most of the explanatory power. This suggests that liquidity is the main driver of price impact.

Key words: Australian Stock Exchange; Block trades; Determinants; Evidence; Pricing.

Large or 'block' transactions play a major role in trading on stock exchanges worldwide. Nearly half of the trades on the NYSE are made in blocks of 10,000 shares or more. Jain (2003) claims that institutional activity, which is predominantly made up of block transactions, accounts for over 70 per cent of all trading activity. The significant quantity of block trades has led to substantial research in the area. Most examines the price impact of block trades, where price impact is measured by comparing the transaction price to an unperturbed price that would have prevailed if the trade were not executed.[1] The causes of price impact are also addressed in the literature. In particular, this has centred on explaining the magnitude and variation in price impact.

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[1] See Holthausen *et al.* (1987, 1990), Choe *et al.* (1992), Chan and Lakonishok (1993, 1995, 1997), Keim and Madhavan (1995, 1996, 1997), Domowitz *et al.* (2001) and Chiyachantana *et al.* (2004) in the United States, Gemmill (1996) and Bozcuk and Lasfer (2005) in the United Kingdom and Aitken and Frino (1996a) in Australia.

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The first study to explore the determinants of the price impact of large trades was Kraus and Stoll (1972).[2] They argue three factors can lead to price impact. First, price concessions are often required to find block transaction counterparties (i.e., find liquidity), and thus short-run liquidity effects could lead to price impact. Second, inelastic supply and demand curves, in that stocks are not perfect substitutes for each other, lead to price concessions and thus price impact. Finally, the information conveyed by large orders results in price adjustment or impact and thus new equilibrium stock prices. In their seminal paper, Kraus and Stoll regress the value of block trades on price impact and find that the size of trades is positively related to the magnitude of price impact.

Several studies build on this original work to attempt to better explain price impact. Holthausen *et al.* (1987) use a firm-size adjusted volume variable and confirm that larger trades have the greatest price impact.[3] The impact of stock price volatility is examined by Chan and Lakonishok (1997), Domowitz *et al.* (2001), Conrad *et al.* (2001) and Chiyachantana *et al.* (2004). These studies find that volatility is positively related to price impact. They argue that elevated volatility is associated with greater dispersion in beliefs, with risk averse traders less inclined to participate in markets, thereby resulting in greater price concessions or price impact (Domowitz *et al.*, 2001). Several studies, including Chan and Lakonishok (1995), Aitken and Frino (1996b) and Chiyachantana *et al.* (2004), also find substantial variability in price impact across brokers and money managers, arguing that this reflects the ability of trading desks to execute orders.

A market return variable to control for underlying market movements is also examined by Aitken and Frino (1996b), Bonser-Neal *et al.* (1999) and Chiyachantana *et al.* (2004). These studies show that market returns are positively related to price impact. Aitken and Frino (1996b) and Gemmill (1996) include the bid–ask spread to examine the effect of underlying stock liquidity on price impact and find that wider spreads lead to greater price impact. Stock price momentum variables, used by Jones and Lipson (1999) and Conrad *et al.* (2001) to examine the effect of past stock price performance, are not significantly related to price impact. Other variables relating to market structure and trading platforms are also examined.[4] While all of these models extend the original study by Kraus and Stoll (1972), each of the variables has limited explanatory power, with overall models explaining only a small portion (generally less than 5 per cent) of the variation in price impact.

This article extends previous research by including time of day dummy variables to explore time dependencies in price impact. Several studies show that proxies for liquidity exhibit particular patterns across the trading day. McInish and Wood (1992) document a U-shaped intraday pattern in spreads, with spreads reaching a maximum at the close of trading.[5] Lee *et al.* (1993) show that wider spreads and increased volume (especially towards the close of trading) lead to a reduction in quoted depth. As liquidity affects the price impact of block trades, it is possible that there are time dependencies in price impact.

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[2] See also Scholes (1972) and Ball and Finn (1989) for the first ASX based study.

[3] Barclay and Warner (1993), Brown *et al.* (1998) and Chakravarty (2001) show that order size conveys information, which in turn could lead to variation in the price impact of trades.

[4] See Chan and Lakonishok (1997) for a comparison of the NYSE and Nasdaq, and Keim and Madhavan (1996) for a comparison of trading in upstairs and downstairs markets.

This article also uses refined measures for two variables examined in previous studies. The market return variable has previously been calculated over the entire day that a block trade is executed. A large rise in the market index in the last half hour of trading is not likely to affect a block trade executed in the first half hour of the trading day.[6] We thus calculate market returns over the same time interval that the price impact is measured. A theoretical study by Saar (2001) shows that the trading intensity of a portfolio manager is dependent on the price performance of a stock, and thus lagged cumulative returns will affect the magnitude of price impact. Previous studies measure this variable over one to two trading days prior to the block trade. As portfolio managers' trading decisions are formed over longer horizons (Chan and Lakonishok, 1995), unlike previous research, we test lagged cumulative returns over the five trading days prior to the block trade.

The bid–ask spread variable is included to examine the role of liquidity on price impact. Aitken and Frino (1996b) examine whether the bid–ask spread explains variation in the price impact of packages of transactions executed by a broker, and find that the spread is not a significant explanatory variable.[7] Gemmill (1996) examines the ability of the bid–ask spread to explain the price impact of large transactions executed off-market on the London Stock Exchange, finding very little explanatory power for the price impact of off-market trades. Our work includes the bid–ask spread to further examine the effect of liquidity on the price impact of single block trades which are executed on-market.

In addition to this primary motivation, analysing factors that lead to price adjustment surrounding block trades has implications for the reporting of financial positions. According to the Financial Accounting Standards Board (FASB 157), the quoted price should not be adjusted due to the size of the trade, even if the market's normal daily trading volume is insufficient to handle the size of the trade, resulting in price impact. Thus understanding the determinants of price impact (and being able to control the level of price impact) has important financial reporting implications.

DATA AND METHOD

The available data for this study contain complete records describing all trades and orders submitted to the ASX. Each trade and order record contains a date and time stamp (to the nearest hundredth of a second) as well as price and volume fields. Intraday data for the Share Price Index (SPI) futures traded on the Sydney Futures Exchange is also available, and contains trade and quote records with fields similar to that available from the ASX. The SPI is used to avoid non-synchronicity problems associated with the underlying index (see Stoll and Whaley, 1990). The data extends from 1 January 1992 to 31 December 2001.

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[5] Aitken *et al.* (1995) show that volumes tend to be higher at the commencement of trading, then fall throughout the day, before rising towards the end of the day and peaking at the close of trading.

[6] See Harris (1989).

[7] Aitken and Frino (1996b) define trade packages as successive purchases/sales by the same broker in the same stock on the same day.

As the ASX does not employ a standard definition for block trades, block trades are defined as the largest 1 per cent of on-market transactions for each stock, in each calendar year, over the sample period. Trades in which market orders execute against a series of limit orders are combined and treated as one transaction for the purposes of identifying block trades.[8] These trades are classified as block purchases if they execute against standing limit ask(s) orders or block sales if they execute against standing limit bid(s) orders.[9]

Several trades are excluded from the analysis. The ASX employs a complex opening auction. Each stock has a random opening time (within a 30 second interval), with all overlapping buy and sell orders matched at a price determined (by SEATS) using a computer algorithm. To avoid any randomness introduced by this process, all trades executed in the opening auction are excluded from the analysis. To ensure that a 'clean' sample of block trades is examined, trades that execute near the open or close of trading are removed. Specifically, block trades that execute within the first five trades or the last five trades on the day are excluded.[10] Also excluded are block trades that execute within five trades of another block trade.[11]

Table 1 profiles the transactions examined here. The overall sample consists of 80,400 block purchases and 86,576 block sales. The mean size of purchases is 163,007 shares ($631,429), while the mean size of sales is 177,864 shares ($621,979). This indicates that the sample is made up of a similar number of purchases and sales, and they are of similar average size. However, there is substantial difference between the maximum values for purchases and sales. This difference in extreme values is tested later by removing the largest and smallest 1 per cent of trades.

In order to examine variation in the magnitude of the price impact of block trades, the following regression is estimated:

$$\begin{aligned}\text{Price Impact} = {} & a_0 + a_1\ln(\text{Size}) + a_2\text{Volatility} + a_3\ln(\text{Turnover}) \\ & + a_4\text{BAS} + a_5\text{Market Return} + a_6\text{Lagged Return} \\ & + a_7\text{Time}_1 + a_8\text{Time}_2 + \varepsilon \qquad (1)\end{aligned}$$

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[8] The price of the final limit order is used in the calculation of price effects for aggregated trades. To test the robustness of this, the first limit order price and a volume weighted limit order price are also used throughout the analysis, leading to consistent results. These results are available upon request.

[9] Off-market transactions are excluded from the analysis because it is not possible to determine accurately the time at which they occur, and because they do not involve the submission of buy and sell orders and therefore cannot unambiguously be categorized as purchase or sale transactions.

[10] Quotes that are not observed after the completion of the market opening process are also removed.

[11] The cleaning procedure is similar to that used in Aitken and Frino (1996a) and Frino *et al.* (2005).

TABLE 1

SUMMARY STATISTICS OF TRADE SIZE

	Number of observations	Mean	Median	Minimum	Maximum	*SD*
Panel A: Share volume						
Purchases	80,400	163,007	100,000	1,000	44,000,000	340,801
Sales	86,576	177,864	100,000	600	85,878,000	795,198
Panel B: Dollar value						
Purchases	80,400	631,429	530,500	4,474	107,800,800	1,174,954
Sales	86,576	621,979	511,200	4,130	343,077,730	1,512,895

This table reports the number of observations, the mean, median, minimum, maximum and standard deviation of share volume (Panel A) and dollar value (Panel B) for block trade size. The sample consists of the largest 1 per cent of trades, in each stock, in each calendar year, on the ASX, for the period of 1 January 1992 to 31 December 2001. Transactions are classified into purchases and sales using a quote based rule.

To ensure consistency and comparability with prior literature, Price Impact represents one of the three following measures.[12] The total effect is calculated as the percentage return from five trades prior to the block trade to the block trade. The temporary effect is calculated as the percentage return from the block trade to five trades after the block trade. The permanent effect is calculated as the percentage return from five trades prior to the block trade to five trades after the block trade.[13] As several studies have shown that transaction price data could contain microstructural biases, we replace transaction prices with quotes in existence immediately prior to each transaction in the calculation of price effects.[14]

Size is the number of shares traded in each block transaction. Various measures of size, including the number of shares traded, the dollar value of the trade, the natural logarithm of the dollar value of the trade, the volume relative to average daily trading volume and dollar value relative to average daily trading value, are tested. Overall the natural logarithm of the number of shares traded provides the best fit for the model. Larger sized trades are expected to be associated with greater price impact.[15]

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[12] $$\text{Total Effect} = \frac{\text{Block Quote} - \text{Quote}_{-5}}{\text{Quote}_{-5}}$$

$$\text{Temporary Effect} = \frac{\text{Quote}_{+5} - \text{Block Quote}}{\text{Block Quote}}$$

$$\text{Permanent Effect} = \frac{\text{Quote}_{+5} - \text{Quote}_{-5}}{\text{Quote}_{-5}}$$

[13] The use of five-trade benchmarks is consistent with Holthausen *et al.* (1990) and Gemmill (1996).

[14] See Harris (1989), Foerster *et al.* (1990), Lease *et al.* (1991), Bhardwaj and Brooks (1992), Cox and Peterson (1994) and Frino *et al.* (2005) regarding the use of quote rather than transaction price data.

[15] All alternative measures of volume provide consistent results.

Volatility is the standard deviation of trade to trade returns on the trading day prior to the block trade.[16] An increase in volatility increases the risk to market participants, resulting in possible counterparties to block transactions demanding greater compensation. We thus expect that volatility will be positively related to price impact. Turnover is the (natural logarithm of) total dollar value of on-market stock turnover on the trading day prior to the block trade, and is a proxy for liquidity. It is anticipated that turnover will be negatively related to price impact. BAS represents the proportional bid–ask spread immediately prior to the block order being released to the market, and is another proxy for liquidity.[17] Trades executed when liquidity is high and spreads tight are expected to have lower price impact, and thus a positive relationship to exist between BAS and price impact.

Market Return represents the return on the SPI futures contract. While Aitken and Frino (1996b) and Bonser-Neal *et al.* (1999) calculate a market return on the day of the block trade, we use a more refined measure of market return. In particular, market return represents the percentage return on the SPI from five trades prior to the block trade to the block trade for the total effect, the return from the block trade to five trades after the block trade for the temporary effect, and the return from five trades prior to the block trade to five trades after the block trade for the permanent effect. A positive relationship is expected to exist between market return and price impact.

The Lagged Return variable is calculated as the cumulative daily return to the stock on the five trading days prior to the block trade. As articulated earlier, Saar (2001) proposes that momentum in the stock price affects the price impact of block trades. Thus a positive (negative) relationship is expected to exist between the cumulative stock return and the price impact for block sales (purchases). That is, *negative* coefficients should exist for both block purchases and sales for this variable.

Finally, to examine any time dependencies in price impact, we include time of day dummy variables. The trading day is divided into three segments, with Time_1 taking the value of one if the block trade occurs in the first hour of trading (up to 11 a.m.) and Time_2 taking the value of one if the block trade occurs between 11 a.m. and 3 p.m. As spreads tend to be wider and depth tends to be lower at the end of the day,[18] we expect that the price impact of block trades executed in the final hour of trading will be greater than the price impact of all other block trades (negative coefficients for both Time_1 and Time_2).[19]

REGRESSION RESULTS

Table 2 presents the results for both purchase and sale transactions. The dependent variables—total, temporary and permanent effects—are calculated

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[16] We also calculate volatility using quote midpoints with qualitatively similar results.

[17] $\text{BAS} = (\text{Ask} - \text{Bid})/(\text{Ask} + \text{Bid})/2$

[18] See McInish and Wood (1992) and Lee *et al.* (1993).

[19] For our sample of block trades, we find that approximately 25 per cent of block trades are executed in the final hour of trading, while the first hour of trading includes about 20 per cent of block trades.

TABLE 2

REGRESSION RESULTS: DETERMINANTS OF THE PRICE IMPACT OF BLOCK TRADES

	Total effect		Temporary effect		Permanent effect	
	Purchases	Sales	Purchases	Sales	Purchases	Sales
Panel A: Price impact estimates						
Mean Return	0.2056***	–0.1540***	0.1886***	–0.1348***	0.3942***	–0.2889***
Panel B: Regression results						
Intercept	1.129***	–0.9323***	0.4418***	–0.3298***	1.856***	–1.653***
Size	0.0851***	–0.0833***	0.0170***	–0.0231***	0.1128***	–0.1201***
Volatility	0.0060***	–0.0018**	0.0096***	–0.0013**	0.0129***	–0.0025***
Turnover	–0.0157***	0.0057**	–0.0151***	0.0047***	–0.0412***	0.0259***
BAS	0.5051***	–0.4825***	0.3678***	–0.2864***	0.8678***	–0.7550***
Market Return	0.2684***	0.3177***	0.2405***	0.3036***	0.3747***	0.4524***
Lagged Return	0.0040***	–0.0031***	0.0004*	–0.0018***	0.0039***	–0.0048***
Time_1	0.1123***	–0.1795***	0.0159*	–0.0516***	0.0935***	–0.2141***
Time_2	0.0006	–0.0056	0.0084	–0.0101	0.0010	–0.0119
Adjusted R^2	17.29	12.26	15.37	9.00	28.53	19.55

*** indicates statistical significance at the 0.001 level, ** indicates statistical significance at the 0.01 level, * indicates statistical significance at the 0.05 level. This table presents the price impact estimates (Panel A) and regression results (Panel B) of the following model:

$$\text{Price Impact} = a_0 + a_1\ln(\text{Size}) + a_2\text{Volatility} + a_3\ln(\text{Turnover}) + a_4\text{BAS} + a_5\text{Market Return} + a_6\text{Lagged Return} + a_7\text{Time}_1 + a_8\text{Time}_2 + \varepsilon,$$

where Price Impact is one of total, temporary and permanent effects (in percent), Size is the natural logarithm of the number of shares traded, Volatility is the standard deviation of trade to trade returns on the trading day prior to the block trade, Turnover is the natural logarithm of total stock turnover on the trading day prior to the block trade, BAS is the proportional (to the quote midpoint) bid–ask spread immediately prior to the block trade, Market Return is the return on the SPI futures contract over the same time horizon as the dependent variable, Lagged Return is the cumulative stock return over the five trading days prior to the block, Time_1 takes the value of 1 if the trade occurs in the first hour of the trading day and Time_2 takes the value of 1 if the trade occurs between 11 a.m. and 3 p.m.

using contemporaneous quotes.[20] As block purchases occur at the ask quote, and block sales at the bid quote, the price effects are calculated using ask quotes for purchases and bid quotes for sales.[21] Panel A presents price impact estimates. Block purchases have a total effect of 0.2056 per cent, while the total effect for block sales is −0.1540 per cent. The continuation following these trades averages 0.1886 per cent for purchases and −0.1348 per cent for sales. The overall permanent effect for block purchases is 0.3942 per cent, while the overall permanent effect for block sales is −0.2889 per cent.

Panel B of Table 2 reports the estimated coefficients for the explanatory variables. The volume coefficient in all cases is significantly different from zero, with larger volumes associated with greater price impact, as expected. The volatility coefficient is significantly positive for buys and significantly negative for sales. Increased volatility leads to greater price impact for both block purchases and block sales, consistent with previous studies including Chan and Lakonishok (1997) and Chiyachantana *et al.* (2004). The turnover coefficient is significantly negative for purchases, and significantly positive for sales, indicating that increased liquidity reduces the price impact of block trades.

The BAS coefficient is significantly positive for block purchases, and significantly negative for block sales, consistent with both Aitken and Frino (1996b) and Gemmill (1996). Wider spreads lead to greater price impact. The market return coefficient is significantly positive for both block purchases and block sales. A positive market return leads to larger price impact for block purchases and smaller price impact for block sales. This is consistent with the findings of both Aitken and Frino (1996b) and Bonser-Neal *et al.* (1999). The lagged return coefficient is significantly positive for block purchases and significantly negative for block sales. Larger price run-ups lead to larger price impact for both block purchases and block sales, contrary to the prediction by Saar (2001).

The coefficients for the time of day dummy variables indicate that for both block purchases and sales, block transactions executed in the first hour of trading are associated with the largest price impact compared to block trades in the final hour of trading. Block transactions executed in the middle of the trading day experience price impact not significantly different from block transactions executed at the end of the trading day. Contrary to the hypothesis that block trades in the final hour of the trading day have the greatest price impact, we find that block trades executed in the first hour of trading experience the greatest price impact.

Panel B of Table 2 also reports *R*-squared estimates. The *R*-squared values range from a low of 9.00 per cent with the temporary effect for block sales, to a high of 28.53 per cent with the permanent effect for block purchases. The model

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[20] Bessembinder (2003) and Peterson and Sirri (2003) show that execution cost estimates are least biased when measured using contemporaneous bid–ask quotes.

[21] We also estimate the regressions using price impact calculated with transaction prices. The results from this are qualitatively similar, and are available upon request.

TABLE 3

INCREMENTAL EXPLANATORY POWER CONTRIBUTED BY DETERMINANTS OF THE PRICE IMPACT OF BLOCK TRADES

	Total effect		Temporary effect		Permanent effect	
	Purchases	Sales	Purchases	Sales	Purchases	Sales
Full Model	17.29	12.26	15.37	9.00	28.53	19.55
Size	17.08***	12.17***	15.36**	8.82***	28.20***	18.32***
Volatility	17.08***	12.25**	14.64***	8.99**	28.02***	19.54***
Turnover	17.17***	12.25**	15.18***	8.98***	28.19***	19.41***
BAS	6.97***	3.51***	7.83***	2.84***	12.73***	6.48***
Market Return	16.73***	11.79***	15.32***	8.92***	28.03***	18.94***
Lagged Return	17.12***	12.18***	15.35***	8.94***	28.48***	19.43***
Time-of-Day	17.10***	11.86***	15.34***	8.94***	28.45***	19.22***

*** indicates statistical significance at the 0.001 level, ** indicates statistical significance at the 0.01 level, * indicates statistical significance at the 0.05 level.

This table presents the adjusted R-squared values of the following model:

$$\text{Price Impact} = a_0 + a_1\ln(\text{Size}) + a_2\text{Volatility} + a_3\ln(\text{Turnover}) + a_4\text{BAS} + a_5\text{Market Return} + a_6\text{Lagged Return} + a_7\text{Time}_1 + a_8\text{Time}_2 + \varepsilon,$$

where Price Impact is one of total, temporary and permanent effects (in percent), Size is the natural logarithm of the number of shares traded, Volatility is the standard deviation of trade to trade returns on the trading day prior to the block trade, Turnover is the natural logarithm of total stock turnover on the trading day prior to the block trade, BAS is the proportional (to the quote midpoint) bid–ask spread immediately prior to the block trade, Market Return is the return on the SPI futures contract over the same time horizon as the dependent variable, Lagged Return is the cumulative stock return over the five trading days prior to the block, Time_1 takes the value of 1 if the trade occurs in the first hour of the trading day and Time_2 takes the value of 1 if the trade occurs between 11 a.m. and 3 p.m. From the full model, one variable at a time is removed, the regression re-estimated and the R-squared recalculated. The statistical significance refers to the F-test from Greene (2003), which tests if the removal of a variable significantly affects the R-squared value.

estimated in this study explains more variation in the price impact of block trades than the best models from previous research.

Following Chan and Lakonishok (1993), to test the proportion of variation in price impact explained by each variable, one variable at a time is removed from the full model and the regression re-estimated. To determine if the removal of a variable has reduced the fit of the model, we use the F-test described by Greene (2003) which compares the R-squared values from the full and alternate models. The results are presented in Table 3.

The statistical significance of all values are significant at the 1 per cent level or better. Each explanatory variable adds predictive power to the model. When the BAS variable is removed, the R-squared value drops substantially (for example, the R-squared falls from 17.08 to 6.97 with the total effect for purchases). The bid–ask spread is the most significant factor in explaining variation in price impact. When the market return variable is removed, the R-squared value drops significantly, especially for block sales. The underlying market conditions, as shown by Chiyachantana *et al.* (2004), are important in explaining variation in price impact.[22]

TESTS OF ROBUSTNESS

A number of tests are conducted to ascertain the robustness of the results presented in Table 2.[23] To further explore the role that the cumulative stock return has on price impact, the lagged return variable is recalculated as (a) the return to the stock on the trading day prior to the block trade, (b) the cumulative return on the two trading days prior to the block trade and (c) the cumulative return on the ten trading days prior to the block trade. To further investigate time dependencies in price impact, six dummy variables for each hour of the trading day are included. The results from these alternative regressions are consistent with earlier findings. The lagged return coefficients indicate that larger price run-ups lead to larger price impact for both block purchases and block sales. The argument proposed by Saar (2001) does not hold. Block trades executed in the first hour of the trading day are associated with the greatest price impact *vis-à-vis* block trades executed in the final hour of trading. Trades executed in the second hour of trading have price impact slightly larger than the price impact of block trades executed in the final hour of trading. Block trades executed between midday and 3 p.m. have price effects insignificantly different from block trades executed at the end of the trading day.

Second, to explore if the choice of pre- and post-trade benchmarks unduly affect results, the five-trade benchmarks are replaced with the quotes in existence ten trades before and after the block trade, and the opening and closing quotes on the day of the block trade. The results are similar to the original findings reported in Table 2. Although the *R*-squared values are slightly reduced, the coefficient estimates remain relatively unchanged, both in terms of direction and statistical significance.

Third, to explore how sensitive results are to extreme observations, we exclude the largest and smallest 1 per cent of the block trade sample and then re-estimate all regressions. To remove very small block trades from the sample, we also impose a minimum restriction of $10,000 on the block trade sample, and again re-estimate regressions. Under both alternatives, results are similar. The direction and statistical significance of all coefficient estimates remain unchanged and *R*-squared values exhibit minimal variation.

Finally, to test how sensitive results are to sample filters, each filter is removed. In particular, all block trades, irrespective of their closeness to the open or close of trading, or to other block trades, are included and the regressions re-estimated.

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[22] To explore if our large sample sizes are driving significance in results, we calculate sample size adjusted t-statistics as outlined in Connolly (1995). All conclusions based on these adjusted t-statistics are consistent with the original conclusions.

[23] All tests of robustness results are available upon request.

Also, defining block trades as the largest 1 per cent of trades can be considered ambiguous. To explore the impact that our sampling procedure has, we include the largest 2 per cent and the largest 5 per cent of trades as alternative definitions, and re-estimate regressions. The coefficients for all explanatory variables remain in the same direction (with consistent statistical significance) as found in Table 2. *R*-squared values show minimal variation with these changes.

SUMMARY

The price impact of block trades is an extensively studied area, with many attempts to explain the variation in the level of price impact. Variables relating to the size of the block trade, liquidity, volatility, market returns and brokers' execution ability are examined. However, each of the variables provides limited explanatory power. This article uses a sample of block trades executed on the ASX to examine the determinants of price impact. We include time of day dummy variables to explore time dependencies in price impact. We use more refined measures for market return and lagged cumulative stock return variables. We also examine the role of liquidity on the price impact of block trades by including a bid–ask spread variable.

The model estimated explains approximately 29 per cent of the variation in price impact. The bid–ask spread is the most significant factor in explaining variation in price impact. Block trades executed in the first hour of trading experience the greatest price impact. Market returns and lagged stock returns are positively related to price impact. Future research could further investigate time dependencies in price impact. In particular, examining whether block trades in the first hour of trading occur late in the hour after buyers/sellers have had time to observe and interpret information revealed during the market opening process, is an important future research avenue.

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Notes on the University of Sydney Pacioli Society Meeting

THE UNIVERSITY OF SYDNEY PACIOLI SOCIETY MEETING, 31 AUGUST 2006

DIFFERENTIAL REPORTING—WHERE IS IT HEADING?

Professor Stewart Jones chaired the Pacioli Society addressed by David Boymal, Chairman of the Australian Accounting Standards Board.

He noted that Australia, through its advocacy of the 'reporting entity' concept, is one of the few countries in the world to require universal application of IFRSs to all 'reporting entities', so defined. However, the notion that all reporting entities—regardless of size and legal incorporation status—should comply with accounting standards has emerged as a highly contentious issue in the high stakes game of global standard setting. A current IASB project for Small and Medium Sized Entities (SMEs) advocates a new differential reporting regime—widely dubbed as 'IFRS Lite'—which will relieve SMEs of potentially burdensome disclosure requirements of full IFRS adoption. According to the IASB, the objective of the SME project is to develop an International Financial Reporting Standard tailored to meet the needs of SMEs, which are broadly defined as entities that (a) do not have public accountability and (b) publish general purpose financial statements for external users.

While IFRS Lite is likely to be very well received by many smaller and medium-sized entities in Australia, there is much uncertainty as to how the IASB proposals will be implemented in the Australian context (the AASB is yet to announce its intentions with respect to the proposals). It is also unclear how the SME proposals will integrate with the current definition and operation of the reporting entity concept in Australia. For instance, if the IASB's proposals become an accounting standard it may well require some currently non-reporting entities in Australia to report considerably more information than was previously required, and vice versa—some entities currently reporting on a full IFRS basis may disclose considerably less under an IFRS Lite regime. David Boymal's presentation emphasizes that the real issue at stake is not the reporting entity concept but the question of differential disclosure itself. However, Professor Walker disagrees and argues that Australia's use of principles-based rules (which has left interpretation of the reporting entity concept largely to practitioners) has contributed to a fundamental failure of Australian regulatory arrangements to secure appropriate standards of accountability by major vehicles for the organization of economic activities.

Bob Walker's commentary is not reproduced here, as his views are well captured in the article which appears in the current issue of *Abacus*. David Boymal's talk follows.

All of a sudden, differential reporting has become the most controversial and interesting topic in the Australian financial reporting scene. Why is this so, and where is it likely to end up?

There is a need to understand the present situation.

The Corporations Act contains a size test for 'Small' Proprietary Companies which is defined as any two of:

- Revenue less than $10m for year,
- Gross assets less than $5m at end of year, and/or
- Fewer than 50 employees at end of year.

Small Proprietary Companies do not have to prepare accounts unless shareholders with at least 5 per cent of votes direct or ASIC directs. They do not have to lodge accounts with ASIC.

Accounting Standards generally apply to:

- Each entity that is required to prepare financial reports in accordance with Part 2M3 of the Corporations Act and that is a reporting entity,
- General purpose financial reports (GPFRs) of each other reporting entity, and
- Financial reports that are or are held out to be general purpose financial reports.

But the core requirements to present a balance sheet, income statement, changes in equity, cash flow statement and notes applies to each entity required to prepare financial reports in accordance with Part 2M3. The Accounting Policies Standard (AASB 108) also applies to all Part 2M3 companies.

A Reporting Entity is 'An entity in respect of which it is reasonable to expect the existence of users dependent on general purpose financial reports for information which will be useful to them for making and evaluating decisions about the allocation of scarce resources'.

A General Purpose Financial Report is 'financial report intended to meet the information needs common to users who are unable to command the preparation of reports tailored so as to satisfy specifically, all of their information needs'.

The position therefore is for the small proprietaries—no accounts, no requirements.

For the reporting entities—full adherence to standards.

For the in-betweens that have to file with ASIC (large proprietaries that are not reporting entities)—no specific requirements in accounting standards other than balance sheet, income statement, statement of changes in equity, statement of cash flows, notes, and accounting policies.

ASIC has a practice note saying that for non-reporting entities, all of the measurement requirements must be followed but not necessarily all of the disclosures. ICAA goes even further in a Business Practice Guide and suggests that tax effect accounting and capitalization of finance leases might also not be applied.

To avoid classification as reporting entities, companies state that they are preparing special purpose reports for the purpose of lodging with ASIC or for the purpose of conforming to their constitution or for the purpose of conducting an annual meeting. I regard these as devices to avoid reporting obligations.

We have tolerated this for a long time. There is no strong regulation by ASIC, so unless auditors get in the way, many entities get away with this unregulated, unofficial differential reporting.

So what has changed? The changed situation mostly comes from the IASB and the application of IFRS.

Firstly, many not-for-profit reporting entities (like charities and business associations) are advising that the introduction of IFRS, in full, is very burdensome for them, both in initial application and ongoing detail, with few or no perceived benefits.

Secondly, the IASB is soon to issue an exposure draft covering the application of IFRS for SMEs. This is a complete differential reporting regime, containing an entire suite of IFRS Lite standards. This will have more simple language, fewer disclosures, fewer optional treatments. Furthermore, the definition of SMEs for this Standard is different from the usual definition because it really deals with that in-between level. According to the IASB an SME is an entity that (a) does not have public accountability and (b) publishes general purpose financial statements for external users. Public accountability is regarded either as the filing of financial statements for the purpose of issuing a class of instruments in a public market or as the holding of assets in a fiduciary capacity for a broad group of outsiders. The new standard will therefore clearly not apply to listed entities, banks, insurance entities, deposit takers, registered managed investment schemes etc., but to whom it does apply will be a local jurisdictional decision.

Thirdly, the IASB has recently issued an ED for a revision to IAS 1, which contains a varied definition of GPFR. They added an explanatory sentence which says, 'GPFR includes those that are presented separately or within another public document such as a regulatory filing or report to shareholders'. Following a concerted effort by the ICAA we received an unprecedented 168 responses expressing concern at the possible demise of the reporting entity concept as a result of this proposed change.

Fourthly, the government has announced a policy of reducing the regulatory burdens on small business, and one suggestion it has made is to change the size test by increasing each of the revenue, assets and employee measures.

What does all of this mean? If producing accounts for regulatory filing or for a report to shareholders makes those accounts GPFR, then the device of denying being a reporting entity and saying that the accounts are for the special purpose of filing or holding a meeting won't work any more, and the full IFRS will have to apply to more companies than at present. If that is the case, then the IFRS Lite proposition starts to sound much better as a means of lessening regulation. But if accounts don't have to be presented at all, then that is even better again as a means of lessening regulation.

With all of this happening it is time to ask ourselves the fundamental question: Why are we requiring some privately owned entities to put their financial information on the public record? Perhaps this fundamental question needs more attention than just varying the size test.

But if we do decide that public regulatory filing is still appropriate, then I think the time has come for us to introduce a real differential reporting regime, with some serious cost/benefit analysis. At this stage, it would appear sensible to consider using the proposed new IASB Lite approach, as the SMEs addressed in that are at the same intermediate level as our large proprietaries, unlisted publics and companies limited by guarantee. Furthermore, if filing on a public register is regarded as publishing for external users, then the IASB definition of an SME actually precisely covers our large proprietaries.

The charities and other not for profits position is a little more complex, as these perhaps have public accountability, and thus the SME definition does not apply to them. Unfortunately, the IASB does not focus on the not for profit sector and is thus not concerned whether or not it achieves the appropriate coverage. We might need an 'Aus' paragraph to cover it if we think some lighter relief is appropriate.

Notice that most of the debate actually focuses around what is a GPFR rather than what is a reporting entity. I think the reporting entity approach/concept is possibly reaching its use-by date, and our past attitudes and approaches might no longer be workable.

I have written to the accounting bodies suggesting that we work together to discuss the SME question when the IASB exposure draft is published and have received a good response from them. Before the end of this year we can expect some round tables on the subject and the debate will receive a lot of public airing and media coverage.

David Boymal, Chairman, Australian Accounting Standards Board

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CONFERENCE ANNOUNCEMENT AND FIRST CALL FOR PAPERS

GUEST SPEAKER: PROFESOR JAMES GUTHRIE
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A conference will be held at Cardiff Business School on 5 and 6 July 2007 to discuss these and related topics. Papers are invited on all aspects of **Financial Reporting and Business Communication**. This includes empirical, case study and review articles on such topics as the **measurement, disclosure, presentation, communication and impact** of financial and business information contained in the annual reports and other business documentation in both the private and public sectors. Organisational, historical and international studies are welcomed. Details, including the titles of a selection of papers presented at previous conferences can be found at:

http://www.cardiff.ac.uk/carbs/conferences/past/frbc_2006.html

Should you wish to have a paper considered for presentation at the conference, please send a 500 word abstract to the organisers by 2 March 2007.

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IFRSS ENTER A FAIR VALUE, EXIT PRICE WORLD?

EDITORIAL

The June 2007 issue appears when the accounting profession world-wide continues to grapple with tensions emerging from implementing IFRSs (whether the 'lite' or 'heavy' form), namely, how to cope with having a universal standards setter and using measurement standards emerging under the compromise IFRS regime. Those standards advocate a system of fair value—what some are calling exit price—accounting. Were exit prices to be the preferred measurement basis this would no doubt sit well with the founder of this journal, the late Ray Chambers, whose CoCoA system is arguably the exemplar exit price accounting system.

Some of the many relevant issues have been mentioned in earlier editorials—see June 2004; March, June and September/December 2006; March 2007—but of specific interest presently is the potential U.K., European and U.S. divide over what is meant by 'fair value'. The recent U.K. ASB Draft Response to the 2006 IASB Discussion Paper, *Fair Value Measurements*, aptly captures the matter:

> **A standard by standard approach**
> 9 US GAAP has long been based on a tradition of rigid adherence to historical cost. The use of fair value to date has been focused on financial instruments and business combinations; whereas the IASB has to date used fair value more widely. To converge two very different sets of uses, with one definition which is intended to apply to all uses of fair value is inappropriate and, the ASB believe it will present difficulties which have not been adequately discussed. How fair value is reflected in IFRS needs to be considered standard by standard.
>
> **Market participants and 'entity specific' considerations**
> 10 SFAS 157 is based on the presumption that efficient markets are available for all transactions and this approach needs a 'market participant' to be identified. Markets are not always efficient and hence measurement from a market participant's view is necessarily flawed. Most transactions, it seems to us, occur in an imperfect market and are a result of individual negotiations between two contracting parties. The search for a hypothetical market participant in an imperfect market is in our view a fruitless exercise often leading to a result which is neither relevant nor representationly faithful.

We await with interest how the resolution of these tensions is to be achieved. The potential impasse provides an opportunity for researchers to put evidence 'on the table' to assist regulators. Hopefully that evidence will identify the types of information (fair value in its exit price or other guises) relevant to the various uses made of publicly reported accounting data.

It is opportune that *Abacus* continues to concern itself with international studies on accounting, especially those emphasizing accounting decision usefulness. The decision usefulness criterion underpins the *Abacus* US$10,000 Annual Manuscript Awards, the first of which will be chosen from all articles published in 2007. To coincide with its ISI listing the owner of *Abacus*, the Accounting Foundation, announced last year that it will fund the award to reinforce the journal's continuing decision-usefulness focus explicit in its objectives stemming from the vision of Ray Chambers. The first recipient of the award will be announced in 2008.

The journal continues to be an outlet for quality research examining matters directed to improving accounting thought and practice. The recent audited figures show that *Abacus* reaches to hard copy subscribers in more than thirty countries with a circulation of about 2,700 with an additional 1,500 libraries internationally having access through licensed databases. In 2006 over 78,000 *Abacus* full articles were downloaded online from the Blackwell Synergy search engine.

Another feature of the 2007 operations is the scheduled special Abacus Forum session within the Fourth Workshop on Accounting and Regulation. It will take place in the Graduate College of Santa Chiara at the University of Sienna, Italy, on 20–22 September 2007. Invited presenters are Professor Joshua Ronen of the Stern Business School, New York University, and Professor Geoffrey Whittington of the University of Cambridge and the U.K.'s Accounting Standards Board, and until recently a member of the International Accounting Standards Board. A discussant will review those presentations.

Five articles are scheduled for the June and December issues. However, the September 2007 issue will contain papers presented at the September 2006 Abacus Forum on 'Distress Prediction' held at The University of Sydney. The Editor and Professor Ed Altman of the Stern School of Business, New York University, will co-edit the issue. Authors and discussants of forum papers include leading academics, Ed Altman, David Hensher, Stewart Jones, Michael Bradbury, Bob Walker, Andreas Charitou and Kenth Skojsvik. Preliminary papers were presented and reviewed at the Forum, which focused on public and private sector empirical distress prediction, a topical line of research given the spate of corporate scandals in the new millennium, and the added importance of risk models under the new Basel II framework. A range of topics of immediate interest includes research on distress prediction in the private and public sectors, corporate debt default and recovery rates predictions, how best to turn around companies, and how to assess the likelihood of shareholders receiving returns from U.S. Chapter 11 bankruptcies.

Two analytical papers with implications for empirical research introduce the June issue. They address primarily external reporting issues. The first, Atuallah, Higson and Tippett's 'The Distributional Properties of the Debt to Equity Ratio: Some Implications for Empirical Research', assesses the quasi-supply side model of the firm developed in the article by Ashton, Dunmore and Tippett (2004) by testing (using thirty-two years of U.K. data) the prediction of the model that the evolution of a firm's debt to equity ratio will be compatible with a non-linear (target adjustment) process whose underlying probability density function possesses no convergent moments. Specifically, it seeks to determine whether the evolution of the debt to equity ratio is compatible with a 'long (fat) tailed' density function with no convergent moments. Evidence adduced implies that the linear dynamic models which characterize empirical work in this area are mis-specified and will return inconsistent and temporally unstable estimates of the target adjustment process as a consequence.

The second, Su's 'Optimal Smoothing of Profit Via Overhead Allocation', demonstrates how overhead cost allocations can be applied to smooth accounting earnings optimally. The approach of works by Lane and Willett (1997, 1999) is adopted, whereby a depreciation formula was derived and applied. In particular, Su shows that, to realize an income smoothing effect in profit making firms, the usual optimal strategy produces over-allocated costs, thereby supporting the accounting principle of conservatism.

The external reporting focus continues, but returns to the theme of the September–December 2006 Abacus Forum on international accounting. Jaafar and McLeay's 'Country Effects and Sector Effects on the Harmonization of Accounting Policy Choice' assesses the extent of accounting harmony in Europe prior to the recent switch to IFRSs. It studies inventory, depreciation and goodwill policies, and provides novelty by introducing odds of using alternative accounting methods as predicted by logistic regression. The empirical results suggest that, while international exposure and firm size are significant factors, country effects are considerably greater than sector effects, which is inconsistent with harmonized accounting.

Frost's article then switches attention to environmental reporting. 'The Introduction of Mandatory Environmental Reporting Guidelines: Australian Evidence' also adopts a different method and setting. It augments the empirical literature on environmental reporting by analysing the impact of introducing mandatory reporting guidelines on the environmental disclosures of seventy-one Australian companies following the enactment in 1998 of s. 299(1)(f) of *Corporations Law 2001* that requires companies to report on their environmental performance with respect to any 'particular and significant environmental regulation'. The analysis directly links increases in reporting and the introduction of s. 299(1)(f), therefore highlighting the limitations of continual reliance upon voluntary reporting to provide consistent substantive information on environmental performance. It also provides evidence that the introduction of additional reporting media influences the level of disclosure of environmental information within the annual report.

The issue concludes with another shift, as assessing performance in the public sector takes centre stage—in a New Zealand corporatization setting. Hooks and van Staden compare four financial performance measures of three entities (one corporatized, another privatized and the third trust-owned) over a fifteen-year period. The results show that by the end of the period, corporatization, commercialization and ownership form are found to influence the levels of financial performance and debt funding. Of interest is whether this proves to be time specific.

Finally, it is worth noting that, as the inside front cover lists, Board membership now approaches forty of the leading accounting researchers internationally. That increased *Abacus* Board membership will see further changes to be announced in the first issue of 2008, when other changes to the journal structure will also be provided. To reiterate important recent announcements, a complete set of back issues of more than forty-years of *Abacus* has been digitized and is now available to researchers in an e-accessible form from the Blackwell's website using its Synergy search engine. There is also direct access from the Synergy Abacus site to the Chambers Collection (see insert to the *Abacus*, September–December 2006).

Graeme Dean
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March 2007

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The Distributional Properties of the Debt to Equity Ratio: Some Implications for Empirical Research

The purpose here is to assess empirically the quasi-supply side model of the firm developed in the paper by Ashton *et al.* (2004) by testing the prediction of the model that the evolution of a firm's debt to equity ratio will be compatible with a non-linear (target adjustment) process whose underlying probability density function possesses no convergent moments. Using a thirty-two-year history of the debt to equity ratio for each of ninety 'mature' United Kingdom firms, a non-parametric estimation procedure shows that the debt to equity ratio evolves in terms of a process which is largely consistent with the predictions of this model. In particular, the evolution of the debt to equity ratio is compatible with a 'long (fat) tailed' density function with no convergent moments. This has the important implication, supported by our empirical analysis, that the linear dynamic models which characterize empirical work in this area will be mis-specified and will return inconsistent and temporally unstable estimates of the target adjustment process as a consequence.

Key words: Cramér–von Mises statistic; Debt to equity ratio; Moments; Probability density function.

The debt to equity ratio is an important indicator of risk associated with investment in a firm's equity (Modigliani and Miller, 1958). It is also a key variable in determining a firm's weighted average cost of capital (Modigliani and Miller, 1963) and is a major determinant of the covenants which regulate a firm's capacity to issue and retire debt (Myers and Majluf, 1984). Given this, it is hardly surprising that there is now an extensive literature devoted to the issue of determining the distributional and time series properties of the debt to equity ratio.[1] Peel *et al.* (2004, p. 162) emphasize the critical role of careful modelling in this area by noting that 'in empirical relationships involving financial ratios, it is important that the dynamic process is explicitly modelled. As shown recently by

[1] See the papers by McLeay (1986, 1997), Trigueiros (1995), Whittington and Tippett (1999) and McLeay and Trigueiros (2002) for a detailed catalogue of the relevant literature.

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Granger *et al.* (2001), problems of spurious regression between variables arise even when the variables are stationary, where they are persistent, and where any dynamics are not appropriately modelled.' Ioannidis *et al.* (2003) suggest that these spurious regression and non-stationarity problems might be factors influencing much of the empirical work dealing with the time series properties of financial ratios. They focus on the papers of Tippett and Whittington (1995) and Whittington and Tippett (1999) as exemplars of the problems that might arise with inappropriate modelling of the evolution of financial ratios through time. Fortunately, after extensive empirical testing Peel *et al.* (2004) find that these exemplar papers are largely free of the spurious regression and non-stationarity problems they fear might afflict much of the empirical work in the financial ratios area. The fact remains, however, that the empirical procedures of these (and other) papers of the area are normally based on hypotheses that encompass a unit root in the dynamic processes that are being tested. This in turn implies that the stationarity assumptions of the classical regression model are violated and the t statistics they report will have to be invalid as a consequence.

Our purpose here is to further explore this issue raised in the Peel *et al.* (2004) paper of the crucially important role played by dynamic (target adjustment) processes in shaping the distributional and time series properties of financial ratios. The argument is that the adjustment processes assumed for some of the ratios in Ioannidis *et al.* (2003) and Peel *et al.* (2004) ignore crucial restrictions of the double entry bookkeeping system and it is likely that both the dynamics and the unit root tests on which their analyses are based will be mis-specified because of this (Tippett, 1990, pp. 82–4). Ashton *et al.* (2004) have shown that when account is taken of these restrictions of the double entry bookkeeping system, the evolution of the debt to equity ratio in particular may well be compatible with a long-tailed distributional form that has no convergent moments. Furthermore, our empirical analysis strongly supports the distributional form suggested by the Ashton *et al.* (2004) analysis. Given this, in the next section we briefly summarize the principal modes of analysis in Ioannidis *et al.* and Peel *et al.* and the empirical results obtained from applying them. We then provide a brief summary of the non-linear adjustment mechanism and probability density function for the debt to equity ratio developed by Ashton *et al.* (2004) and of the assumptions on which they are based. The following section summarizes our sample selection criteria and the firms and basic statistical properties of the debt to equity ratios upon which our empirical analysis is based. It also outlines the procedures we applied in estimating the parameters of the Ashton *et al.* (2004) probability density function for the debt to equity ratios of the individual firms comprising our sample. The penultimate section briefly discusses the implications of our results for the proper conduct of empirical work in the area. The final section contains our concluding comments.

The work makes several contributions to the literature. In particular, we show that for the 'mature' firms on which our empirical analysis is based the evolution of the debt to equity ratio is compatible with a non-linear (target adjustment) process whose underlying density function does, in fact, appear to possess no convergent moments. This, in turn, implies that the simple linear dynamic models on which empirical work has been based in the past will be mis-specified, and as a consequence are likely to return inconsistent and temporally unstable estimates of the target adjustment process.

DEBT RATIO DYNAMICS

Tippett and Whittington (1995) estimate the dynamic (target adjustment) processes by which firms rebalance the mix of assets and liabilities appearing on their balance sheets by using the stochastic calculus framework for financial ratios developed by Tippett (1990). This framework suggests a firm will move towards an equilibrium relationship between the various asset and liability categories appearing on its balance sheet by periodically rebalancing its asset portfolio in response to variations in its capital base. Tippett (1990, pp. 79–81) shows that the targeting procedures implied by these stochastic calculus adjustment processes will mean that a firm's financial ratios will evolve in terms of the following regression equation:

$$\Delta r(t) = \alpha + \beta r(t) + \mu t + \varepsilon(t), \tag{1}$$

where $r(t)$ is the logarithm of the ratio at time t; $\Delta r(t) = r(t + \Delta t) - r(t)$ is the first difference in the logarithm of the ratio over the time period from time t until time $t + \Delta t$; α, β and μ are parameters and $\varepsilon(t)$ is a serially uncorrelated error term with a homoscedastic variance. Using a thirty-eight-year time series of four ratios[2] and classical regression procedures, Tippett and Whittington (1995) argue that this model provides a reasonable description of the way the financial ratios they examine evolve in time. However, they do qualify this conclusion with the observation that it is highly unlikely that any of the ratios considered in their study are normally distributed. Furthermore, for some of the ratios they note that there is clear evidence of heteroscedasticity in the error term, $\varepsilon(t)$.

Ioannidis *et al.* (2003, p. 704) raise a number of objections to the procedures on which the Tippett and Whittington (1995) empirical analysis is based. The first of these stems from the fact that Tippett and Whittington (p. 81) note that the variance of the residual term in their regression model will be $\mathrm{Var}[\varepsilon(t)] = \frac{\sigma^2 + \delta^2 - 2\rho\sigma\delta}{2\lambda}(1 - e^{-2\lambda\Delta t})$, where σ^2 is the variance parameter associated with instantaneous proportionate variations in the numerator of the financial ratio, δ^2 is the variance parameter associated with instantaneous proportionate variations in the denominator of the financial ratio, ρ is the product moment correlation coefficient between instantaneous proportionate variations in the numerator and denominator of the financial ratio and λ is the speed of adjustment (or mean reversion) coefficient. As such, λ measures the intensity with which the financial ratio is drawn back towards its equilibrium (or target) value. Higher values of λ will mean that the ratio converges more quickly towards its long run equilibrium value. Finally, Δt is the time period between which observations of the financial ratio are made. Now, Ioannidis *et al.* (2003, p. 712) note that when $\lambda = 0$ there is a unit root in the above regression model. When this condition holds it is not hard to show that the t statistics returned by the classical regression procedures on which most empirical work in this area is based will be largely meaningless. Fortunately, Peel *et al.* (2004) conduct more refined tests on the data used in the Tippett and Whittington (1995) study and conclude that the ratios examined in that study appear to be both stationary and 'very persistent'. In other words, the financial ratios examined in the Tippett and Whittington (1995) study appear to be generated by stationary processes with very large speed of adjustment coefficients, λ.

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[2] These were (a) the liquidity ratio: the sum of cash, marketable securities and tax reserve certificates all divided by current liabilities; (b) current ratio: current assets divided by current liabilities; (c) stock ratio: the sum of stocks and work in progress all divided by current liabilities; and (d) liabilities ratio: total liabilities divided by total assets.

A second concern raised by Ioannidis *et al.* (2003) is that Tippett and Whittington (1995) implicitly assume that the costs of adjusting a ratio are a constant function of the ratio's distance from its equilibrium (or target) value. Here Ioannidis *et al.* (2003, p. 705) note that in the 'presence of fixed adjustment costs it is likely that a firm will only adjust a ratio when its value reaches specific trigger points and that between these trigger points the ratio may fluctuate randomly'. They seek to capture this aspect of the adjustment process by assuming that the financial ratio evolves in accordance with the following stochastic process (Kapetanios *et al.*, 2003, pp. 361–2):

$$\Delta r(t) = (r(t) - \bar{r})\{e^{-\eta(r(t)-\bar{r})^2 \Delta t} - 1\} + \Delta z(t), \tag{2}$$

where, as previously, $r(t)$ is the logarithm of the ratio at time t, $\Delta r(t) = r(t + \Delta t) - r(t)$ is the first difference in the logarithm of the ratio over the time period from time t until time $t + \Delta t$; η is the speed of adjustment coefficient, $\bar{r}$ is the long run equilibrium mean towards which the ratio gravitates and $\Delta z(t)$ is the random error term that emerges over the period from time t until time $t + \Delta t$. This adjustment process has the property that the restoring force will be small when the ratio is close to its equilibrium or target value but will increase exponentially as the ratio moves away from its target value. Ioannidis *et al.* (pp. 709–10) estimate this model using the Tippett and Whittington (1995) data and find that for the large majority of ratios they examine, this non-linear adjustment model is stationary and accounts 'for a substantial amount of the observed inertia in the data'. However, they also note that their testing procedures are not without limitations; in particular, they depend upon an exogenously specified variance parameter and the model itself exhibits instability for large (absolute) ratio values.[3] More important, however, is that the properties of the double entry bookkeeping system are such that it will be impossible for the adjustment processes for many financial ratios to take the form assumed in the Ioannidis *et al.* (2003) and Peel *et al.* (2004) papers.

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[3] Here we should emphasize that Ioannidis *et al.* (2003) calibrate the variance parameters used in their empirical work so that they are compatible with the variances of the four ratios employed in the Tippett and Whittington (1995) regression analysis. Furthermore, the results reported in the various tables contained in Ioannidis *et al.* appear to be relatively insensitive to variations in the variance parameter used.

Probably the easiest way of demonstrating this latter point is to follow Ioannidis *et al.* (2003) in applying a first order Taylor series expansion to the exponential term, $e^{-\eta(r(t)-\bar{r})^2\Delta t} - 1$, in their non-linear adjustment model and then to take limits. The non-linear adjustment model will then assume the following canonical form (Kapetanios *et al.*, 2003, pp. 362–3):

$$dr(t) = -\eta(r(t) - \bar{r})^3 dt + dz(t), \tag{3}$$

where $r(t)$ is the logarithm of the ratio at time t; $dr(t) = r(t + dt) - r(t)$ is the change in the logarithm of the financial ratio over the instantaneous interval from time t until time $t + dt$, η is the speed of adjustment coefficient, $\bar{r}$ is the long term mean towards which the ratio gravitates and $dz(t)$ is a white noise process with variance parameter σ^2. One can then use the procedures summarized in Ashton *et al.* (2004, pp. 599–603) to show that the probability density function, $g(r)$, corresponding to the above adjustment process takes the form:

$$g(r) = \frac{2^{3/4}\eta^{1/4}}{\Gamma\left(\frac{1}{4}\right)\sqrt{\sigma}} \cdot \exp\left[\frac{-\eta(r - \bar{r})^4}{2\sigma^2}\right], \tag{4}$$

where $\Gamma(\cdot)$ is the gamma function. A potential problem with this distributional form is that 'outliers' can have undue influence in parameter estimation due to the fact that differences between the logarithm of the ratio, $r(t)$, and its equilibrium value, $\bar{r}$, are raised to the fourth power. Furthermore, $r(t)$ can potentially assume any real value with a finite probability. For many ratios this latter characteristic is descriptively false and thus, in these instances the above density function is a potentially poor basis on which to conduct empirical work. Of particular concern here is the liabilities ratio, which is the book value of a firm's liabilities divided by the book value of its assets. Now, a fundamental requirement of the double entry bookkeeping system is that the sum of the book value of a firm's liabilities, the book value of its equity and the book value of its assets must be zero. This in turn means that for solvent firms the liabilities ratio can never exceed unity or fall below zero.[4] However, neither the first order mean reversion process summarized in Tippett and Whittington (1995) nor the unit root or more complex non-linear adjustment processes summarized in Ioannidis *et al.* (2003) and Peel *et al.* (2004)

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[4] See, for example, the Shyam-Sunder and Myers (1999, p. 229) summary Table (1) which reports a minimum debt ratio of zero and a maximum debt ratio of 0.82 for the 157 North American industrial companies on which their empirical analysis is based. Furthermore, the U.K. *Insolvency Act, 1986* and the *Company Directors Disqualification Act, 1986* jointly provide that if directors knowingly allow a company to trade while in an insolvent condition they can be found personally liable for any losses that accrue during the period of insolvent trading. Similar legislation exists in other countries, like Australia. The *Company Directors Disqualification Act* also provides that directors who infringe these provisions may be disqualified from acting as directors for a period of up to fifteen years. Hence, given the severe penalties that apply when companies continue trading in an insolvent condition it is unlikely that any of the mature firms on which our subsequent empirical analysis is based will report a negative book value of equity.

incorporate this important property. This means that the dynamic adjustment models on which the analyses in these papers are based can return a predicted liabilities ratio that does not fall between zero and unity. Given this, there must be doubt about the reliability of the inferences drawn in these papers about the liabilities ratio.

Fortunately Ashton *et al.* (2004) have developed a quasi-supply side model of the double entry bookkeeping system that incorporates this requirement that the liabilities ratio will instantaneously fall between zero and unity. Their model also assumes that the firm's equity, assets and liabilities all grow at (in general different) proportionate rates that vary stochastically with time (Trigueiros, 1995).[5] These assumptions in turn imply that the firm's liabilities ratio will evolve in a way that is compatible with a complicated non-linear (target adjustment) process whose underlying density function may possess no convergent moments. Furthermore, these non-linear adjustment processes are markedly different from the adjustment processes employed in Tippett and Whittington (1995), Ioannidis *et al.* (2003) and Peel *et al.* (2004) which exemplify the kind of adjustment processes one normally finds in the empirical literature of the area. One can demonstrate this latter point by recalling that the liabilities ratio takes the form $\nu(t) = \left|\frac{L(t)}{A(t)}\right|$, where $L(t)$ is the book value of the firm's liabilities and $A(t)$ is the book value of its assets, both at time t.[6] Using the fundamental balance sheet identity to eliminate $A(t)$ then shows that the debt to equity ratio will be $\gamma(t) = \frac{L(t)}{E(t)} = \frac{\nu(t)}{1-\nu(t)}$, where $E(t)$ is the book value of the firm's equity. Ashton *et al.* (2004) show that under the proportionate growth assumptions on which their model is based the firm's debt to equity ratio will instantaneously evolve in accordance with the stochastic differential equation (p. 588):

$$\begin{aligned}\frac{d\gamma(t)}{\gamma(t)} = {} & [(\sigma_{12}^2 + \sigma_{13}^2)(1+\gamma(t))^2 + (1+\gamma(t))(\mu_{12} - \mu_{13} - \sigma_{13}^2) - \mu_{23}]dt \\ & + (1+\gamma(t))(\sigma_{12}dz_{12}(t) - \sigma_{13}dz_{13}(t)) - \sigma_{23}dz_{23}(t). \qquad (5)\end{aligned}$$

Here the μ_{jk} are instantaneous expected growth rates associated with the firm's bookkeeping variables, the σ_{jk}^2 are their associated variances and the dz_{jk} are standard Gauss-Wiener processes.[7] This result implies that for the most part the debt to equity ratio will gravitate towards a constant long run equilibrium value with a restoring force that is a non-linear function of the difference between the 'current' value of the debt to equity ratio and its equilibrium value. In addition to this, however, there is a generally small probability that the debt to equity ratio will exhibit 'explosive' properties consistent with the firm entering a period of financial distress or even bankruptcy.[8] The combination of these attributes means that while the tail of the probability density for the debt to equity ratio asymptotes towards to zero, it nonetheless captures sufficient probability density to ensure that none of the debt to equity ratio's moments will converge. Indeed, Ashton *et al.* (2004, p. 589) have shown that the probability density function, $g(\gamma)$, corresponding to the above stochastic differential equation is:

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[5] The proportionate growth assumption employed here has a long history in a variety of contexts—most notably in relation to population growth and the size distribution of cities where it is known as Gibrat's Law of proportionate growth (McLeay and Trigueiros, 2002; Eeckhout, 2004).

[6] Recall that the fundamental balance sheet identity requires that $A(t) + L(t) + E(t) = 0$. This in turn implies that the book value of assets, $A(t)$, will have the opposite sign to the book value of liabilities, $L(t)$, and the book value of equity, $E(t)$. It is this that accounts for the absolute value signs in the definition of $\nu(t)$.

[7] See Cooke and Tippett (2000, pp. 263–7) for a more detailed description of the model of the double entry bookkeeping system that leads to this stochastic differential equation for the debt to equity ratio and of more precise definitions of the proportionate growth parameters $(\mu_{jk}, \sigma_{jk}^2)$ upon which it is based.

$$g(\gamma) = \left[\frac{h}{a(1+\gamma)^2+1}\right] \cdot \left[\frac{\gamma}{\sqrt{a(1+\gamma)^2+1}}\right]^{c-1} \cdot \exp[\sqrt{a}(b-c)\tan^{-1}(\sqrt{a}(1+\gamma))], \quad (6)$$

where $\gamma \geq 0$, h is the 'normalizing' constant which ensures the probability density has a unit area and $c = \frac{\sigma_{12}^2 - \sigma_{13}^2 - \sigma_{23}^2 + 2\mu_{12} - 2\mu_{13} - 2\mu_{23}}{\sigma_{12}^2 + \sigma_{13}^2 + \sigma_{23}^2} > 0$, $b = \frac{\sigma_{12}^2 - \sigma_{13}^2 + 2\mu_{12} - 2\mu_{13}}{\sigma_{12}^2 + \sigma_{13}^2}$ and $a = \frac{\sigma_{12}^2 + \sigma_{13}^2}{\sigma_{23}^2} > 0$ are parameters that depend on the growth rates (μ_{jk}) and variances (σ_{jk}^2) associated with the evolution of the firm's bookkeeping variables.[9]

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[8] The mean reversion properties documented here for the proportionate growth model of the double entry bookkeeping system do not necessarily exclude the possibility that the firm's debt to equity ratio evolves in terms of some kind of pecking order specification. Shyam-Sunder and Myers (1999, p. 240) note that 'mean reversion in debt ratios can generate spuriously good fits [to empirical data], and significant coefficients for target adjustment models, even when mean reversion has nothing to do with optimal debt ratios, but simply reflects pecking-order financing coupled with cycles or mean-reversion in financial deficits or surpluses'.

[9] Previous analytical work shows the ratio of two normal variates with zero means to be distributed as a Cauchy variate (i.e., a Student's *t* distribution with one degree of freedom; Freeman, 1963, pp. 152–4). This too is a distribution with no convergent moments. Now, our analysis here assumes that the elements of the double entry bookkeeping system evolve in terms of a multivariate normal distribution (Ashton *et al.*, 2004, pp. 586–9). While the restrictions imposed by the double entry bookkeeping system mean that the probability distribution for the debt to equity ratio differs from the Cauchy distribution, the normal distribution assumptions will nonetheless imply that the debt to equity ratio evolves in terms of a distribution with no convergent moments. Moreover, one can make the substitution $\gamma(t) = \frac{\nu(t)}{1-\nu(t)}$ in the above distribution in which case it follows that the probability density for the liabilities ratio is:

$$g(\gamma) = h\nu^{c-1}\left[\frac{1}{\sqrt{a+(1-\nu)^2}}\right]^{c+1} \cdot \exp\left[\sqrt{a}(b-c)\tan^{-1}\left(\frac{\sqrt{a}}{1-\nu}\right)\right],$$

where $0 \leq \nu \leq 1$. Note that under this specification the liabilities ratio can never exceed unity or fall below zero.

Ashton *et al.* (2004, p. 589) have noted that 'this is a highly non-standard and awkward distribution' which is difficult to handle in practice. In particular, they show that this probability density has no convergent moments and that because of this considerable care is needed in empirical work which includes the debt to equity ratio as a variable, if dependable results are to be obtained. Here Peel *et al.* (2004, p. 155) note that financial ratios, such as the liability (or debt to equity) ratio, are widely employed as explanatory variables in accounting and finance research applications. They also note that an implicit assumption in this empirical work is that the ratios are at least second order stationary so that the postulated models can be estimated using standard procedures such as the classical regression model or the Generalized Method of Moments (Hansen, 1982; Hamilton, 1994, pp. 412–14). However, the Ashton *et al.* (2004) model of the double entry bookkeeping system raises serious doubts about whether the debt to equity ratio will satisfy these stationarity assumptions and therefore, whether its time series and distributional properties can be determined using these standard statistical procedures. Given this, we now summarize the data on which our empirical analysis is based and we also discuss the procedures used to alleviate potential problems with non-convergent moments in estimating the time series and distributional properties of our debt to equity ratio data.

DATA AND EMPIRICAL PROCEDURES

Our sample consists of all firms having a complete annual history for the debt to equity ratio on the Datastream system for balance sheet reference dates beginning in 1972 and ending in 2003.[10] There were ninety-one firms which satisfied this criterion but the data for one firm had to be excluded due to non-convergence of our parameter estimation algorithm.[11] This means that the empirical analysis is based on a sample of ninety firms. Details of the industry classifications from which our sample of firms is drawn is contained in Table 1, which shows that the firms comprising our sample represent a total of twenty-one broad industry classifications. More detailed information about the sample is summarized in Table 2. This table shows, for example, that in 1972 the smallest debt to equity ratio across the ninety firms on which the empirical analysis is based amounted to 0.0061; the

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[10] WC08231 (Total Debt as a percentage of Common Equity) is the debt to equity ratio employed in our empirical work. This Datstream item consists of the sum of long term debt and short term debt all divided by the book value of the firm's equity. Shyam-Sunder and Myers (1999, p. 227) employ a sampling procedure similar to ours and note that the requirement for continuous data and therefore, the estimation of targeting processes for 'mature' firms only, is consistent with virtually all prior studies in the area. They also note that results based on such sampling procedures may be biased towards relatively large firms with conservative debt ratio policies because of this.

[11] The debt to equity ratio is one of several debt ratios that have been the subject of empirical analysis over the years (Modigliani and Miller, 1958, p. 286; Damodaran, 2005, pp. 373–95). Given this, we replicated the empirical procedures applied to our debt to equity ratio data on Tippett and Whittington's (1995) original liabilities ratio data as well. There were no significant differences between the empirical results we report for our debt to equity ratio data and those obtained when the same procedures were applied to Tippett and Whittington's (1995) liabilities ratio data.

TABLE 1

INDUSTRIAL CLASSIFICATIONS OF FIRMS ON WHICH EMPIRICAL ANALYSIS IS BASED

Industry	No. of firms
Aerospace and defence	2
Automobiles and parts	5
Beverages	2
Chemicals	8
Construction and materials	10
Electronics and electrical Equipment	2
Engineering and machinery	12
Food and drug retailers	1
Food producers and processors	6
Healthcare	1
Household goods and textiles	2
Information technology hardware	1
Leisure and hotels	6
Media and entertainment	2
Mining	1
Oil and gas	2
Personal care and household Products	2
Retailers (general)	8
Support services	10
Tobacco	1
Transport	6
Total Sample	90

median debt to equity ratio for the 1972 year is 0.4618 while the largest debt to equity ratio for 1972 is 1.3359. Finally, the inter-quartile range across the debt to equity ratios for this year is 0.3496.[12] The statistics reported in Table 2 for the other years are to be similarly interpreted.[13]

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[12] We do not calculate the mean and standard deviation of the cross sectional distributions of the debt to equity ratios summarized in Table 2 because the potential non-convergence issue identified in previous discussion means that these may not be meaningful statistics.

[13] The largest debt to equity ratio in the sample is the 248.6666 recorded for British American Tobacco PLC (otherwise known as BAT) for the 1998 balance sheet year. BAT had previously negotiated the de-merger of its financial services businesses with Zurich Insurance and this was completed in September 1998. Dividend payments relating to the de-merger amounting to £6,689 million reduced BAT's shareholders' equity to £64 million on its 1998 balance sheet. It is this that accounts for the relatively high debt to equity ratio as computed from BAT's 1998 balance sheet. We do not delete 'extreme' values of the debt to equity ratio like this from our sample because as Ashton *et al.* (2004, p. 598) note, these 'awkward outliers are actually an integral part of the data set and are to be anticipated rather than simply eliminated from the data'.

TABLE 2

EMPIRICAL DISTRIBUTION OF DEBT TO EQUITY RATIO FOR 90 FIRMS COVERING THE PERIOD FROM 1972 UNTIL 2003

Year	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Smallest observation	0.0061	0.0075	0.0090	0.0070	0.0056	0.0048	0.0020	0.0159	0.0026	0.0176	0.0113
Median	0.4618	0.4194	0.5124	0.4601	0.4334	0.3851	0.3469	0.3402	0.3564	0.3624	0.3938
Largest observation	1.3359	1.5197	1.8736	1.5239	1.5758	1.4811	1.1969	1.2313	1.7528	1.4500	1.7003
Inter-quartile range	0.3496	0.3148	0.3858	0.3312	0.4003	0.3568	0.2716	0.2802	0.3185	0.3002	0.3078
Year	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Smallest observation	0.0174	0.0229	0.0108	0.0127	0.0131	0.0097	0.0151	0.0159	0.0168	0.0124	0.0093
Median	0.4228	0.4445	0.4185	0.4184	0.3865	0.3957	0.3882	0.4495	0.4736	0.5222	0.5038
Largest observation	1.3415	2.5286	1.9772	2.1953	1.3931	2.1385	5.8461	2.2297	3.4323	2.1811	4.6423
Inter-quartile range	0.3197	0.3508	0.3437	0.4047	0.2971	0.4110	0.4930	0.3951	0.4340	0.3816	0.3572
Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	
Smallest observation	0.0046	0.0041	0.0037	0.0039	0.0033	0.0083	0.0038	0.0037	0.0046	0.0048	
Median	0.4113	0.4496	0.4457	0.4814	0.5143	0.5482	0.6484	0.5637	0.5682	0.5615	
Largest observation	3.9158	2.4921	2.6225	2.2981	248.6666	1.8777	4.4609	4.4792	4.6836	4.5879	
Inter-quartile range	0.3359	0.4135	0.3802	0.4912	0.4695	0.5116	0.4970	0.5647	0.6466	0.6152	

Given the potential for problems with non-convergent moments when estimating the time series and distributional properties of the debt to equity ratio, it is tempting to undertake parameter estimation using either the Generalized Method of Moments or a maximum likelihood procedure applied to a simple discretization of the stochastic differential equation describing the evolution of the debt to equity ratio.[14] Here Ashton *et al.* (2004) have demonstrated that under the proportionate growth assumptions on which their model is based the conditional mean and variance of instantaneous proportionate changes in the debt to equity ratio are both convergent. Given this, the idea is that one can legitimately apply conditional estimation procedures based on a simple discretization of the stochastic differential equation describing the evolution of instantaneous proportionate changes in the debt to equity ratio. However, beginning with Bartlett (1946) there is a long and important strand of literature which demonstrates that this approach is fundamentally flawed. In particular, Bartlett (1946) shows that parameter estimates obtained from procedures like this will be inconsistent and moreover, the level of inconsistency is not reduced by employing larger sample sizes.[15]

Our approach is to address these problems caused by the potential non-convergence of moments by employing a procedure suggested by Ashton and Tippett (2006). Thus, let the $n = 32$ debt to equity ratios available for each firm in our sample be arranged in an increasing order of magnitude. Write γ_1 for the smallest debt to equity ratio, γ_2 for the next smallest debt to equity ratio and so on right up until γ_{32} which is the largest debt to equity ratio for the particular firm. We then determine the parameters a, b and c that minimize the Cramér–von Mises goodness of fit statistic, T_3, where (Kendall and Stuart, 1979, p. 476):[16]

$$T_3 = \frac{1}{12n} + \sum_{i=1}^{n} \left[F(\gamma_i) - \frac{2i-1}{2n} \right]^2 \tag{7}$$

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[14] See the article by Brailsford and Maheswaran (1998, p. 215) and the articles to which it refers for examples of how this discretization procedure has been extensively employed by empirical researchers in the past.

[15] See Bergstrom (1990), Chambers (1999) and Lo (1988) for a more detailed treatment of the problems that arise under the discretization procedure briefly summarized here.

[16] See Mood *et al.* (1974, pp. 286–7) for a more detailed description of this procedure which is formally known as the 'minimum distance method'. Peles and Schneller (1989) and Davis and Peles (1994) provide an example of how this minimum distance procedure is implemented using the Chi-square goodness of fit test for a variable that follows the Hotelling (1953) distribution. The lack of a closed form expression for the normalizing constant, h, in the probability density for γ (see equation (6) above) means that parameter estimation using the method of maximum likelihood can only be implemented if the partial derivatives with respect to the normalizing constant, h, are evaluated numerically. Here Ashton and Tippett (2006, p. 1590) quote Carnahan *et al.* (1969, p. 128) who note that numerical differentiation 'tends to magnify small discrepancies or errors in the approximating function' on which the numerical differentiation procedure is based and because of this they recommend that 'numerical differentiation should be avoided wherever possible'. Given these potential dangers associated with maximum likelihood and the method of moments techniques we have opted to follow the suggestion of Carnahan *et al.* (p. 128) of using a 'least squares smoothing procedure' (in our case minimization of the Cramér–von Mises statistic) to estimate the parameters of the probability density function for γ in the empirical work which follows.

and $F(\gamma_i) = \int_0^{\gamma_i} g(\gamma)d\gamma$ is the accumulated area below the i^{th} ordered debt to equity ratio for the Ashton *et al.* (2004) density function.[17] Under the null hypothesis that the debt to equity ratio is generated by the given distributional form, this statistic is known to have a mean of $E(T_3) = \frac{1}{6}$ (Anderson and Darling, 1952) and so potential non-convergence of moments is not an issue with this parameter estimation procedure.[18] The results of this exercise are summarized in Table 3. The first three columns of this table summarize the deciles for the estimated parameters of the Ashton *et al.* (2004, p. 589) probability density as given in equation (6). Thus, the smallest estimate obtained for the parameter a is 0.0006. Furthermore, 10 per cent (or nine of the 90) estimates of the parameter a are (equal to or) less than 0.0016; 20 per cent (or eighteen of the 90) estimates of this parameter are (equal to or) less than 0.0025; 30 per cent (or 27) of the estimates of a are (equal to or) less than 0.0040 and so on. The largest estimate obtained for this parameter is 427.8858 while the median across all ninety estimates in our sample is 0.0151.[19] The decile distributions for the parameters b and c are to be similarly interpreted.

Table 3 also reports two goodness of fit statistics calculated for each of the ninety fitted probability density functions on which our empirical analysis is based. The first of these is the (minimized) Cramér–von Mises goodness of fit statistic, T_3, from which our estimates of the parameters a, b and c are obtained. Under the null hypothesis that the debt to equity ratio is generated by the given distributional form Anderson and Darling (1952, p. 203) have tabulated the asymptotic distribution function for T_3. This shows that there is only a 5 per cent probability that the test statistic, T_3, will exceed 0.4614. Here, Table 3 documents

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[17] The area under $g(\gamma)$ was estimated using fifteen point Gauss-Legendre quadrature (Carnahan *et al.*, 1969, pp. 101–5). This technique integrates polynomials of order twenty-nine or less, exactly.

[18] A note of caution is in order here. As is the case with virtually all empirical testing procedures in the accounting and finance literature (Judge *et al.*, 1982, pp. 657–8) the Cramér–von Mises test statistics reported in the text are computed under a composite hypothesis (Kendall and Stuart, 1979, p. 444). The first element of this hypothesis is that the data are drawn from an Ashton *et al.* (2004) probability density function. The second element of the hypothesis is that the parameter values (a, b and c) for this density function assume particular numerical values. Here, Kendall and Stuart (1979, pp. 476, 485) note that critical values for T_3 are computed on the assumption that these parameters are known *a priori*. This, in turn, means that our testing procedures will be based on an approximation to the true density functions for T_3. Unfortunately, it is only in very special cases (e.g., the normal and exponential distributions) that the true density function for T_3 is known under composite hypotheses. Given this, we also applied a Kolmogorov goodness of fit test to our data based on the hypothesis that the parameter values for the Ashton *et al.* (2004) density function are given by the values obtained from the Cramér–von Mises procedures reported in the text. For both the Kolmogorov and Cramér–von Mises tests our results are so overwhelmingly compatible with the hypothesis that the data are drawn from an Ashton *et al.* (2004) density function with the given parameter values that we doubt that this issue has any significance in the present context.

[19] Again, we do not calculate the mean and standard deviation of the cross sectional distributions of the parameter estimates summarized in Table 3 because the potential non-convergence issue identified in previous discussion means that these may not be meaningful statistics.

TABLE 3

PARAMETER ESTIMATES (a, b AND c) AND GOODNESS OF FIT TEST STATISTICS (T_3 AND T_1) FOR THE PROBABILITY DENSITY, $g(\gamma)$

Percentiles	a	b	c	T_3	T_1
Smallest observation	0.0006	−6,762.53	0.5038	0.0180	0.0606
10	0.0016	−3,828.26	1.0421	0.0270	0.0782
20	0.0025	−2,671.10	1.8855	0.0357	0.0870
30	0.0040	−2,185.62	2.8598	0.0414	0.0937
40	0.0071	−1,512.69	3.8613	0.0463	0.1008
50	0.0151	−267.72	4.8797	0.0520	0.1065
60	0.3494	−60.05	5.6032	0.0645	0.1113
70	2.8729	−29.53	6.6904	0.0745	0.1209
80	4.1397	−18.54	8.6570	0.1008	0.1309
90	22.8098	−11.21	13.4698	0.1094	0.1403
Largest observation	427.8858	−5.51	92.5530	0.2321	0.3236*
Inter-quartile range	3.7730	2,343.47	5.3117	0.0511	0.0367

The first three columns of the above table summarize deciles of the parameter estimates for the probability density:

$$g(\gamma) = \left[\frac{h}{a(1+\gamma)^2+1}\right] \cdot \left[\frac{\gamma}{\sqrt{a(1+\gamma)^2+1}}\right]^{c-1} \cdot \exp[\sqrt{a}(b-c)\tan^{-1}(\sqrt{a}(1+\gamma))]$$

across the ninety firms on which our empirical analysis is based. The last two columns summarize deciles of the Cramér–von Mises goodness of fit statistic, T_3, and the Kolmogorov goodness of fit statistic, T_1, again across the 90 firms on which our empirical analysis is based. * means the relevant statistic is significant at the 1% level.

that for the ninety firms on which our empirical analysis is based, all the Cramér–von Mises test statistics are well below this critical value of 0.4614; indeed, the largest reported value of T_3 is only 0.2321 and this falls between the 0.7 and 0.8 deciles of the tabulated distribution function for the Cramér–von Mises statistic. Hence, relying on the Cramér–von Mises goodness of fit statistic, there can be little doubt that our hypothesized density function, $g(\gamma)$, provides an adequate description of the way the debt to equity ratio evolves for the sample of firms on which our empirical analysis is based.[20]

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[20] We also estimated the parameters of the Ioannidis *et al.* (2003) density function across our ninety firms by minimising the Cramér–von Mises goodness of fit statistic, T_3. This showed that for the Ioannidis *et al.* (2003) density function, four of our ninety firms returned T_3 statistics which exceeded the 0.4614 threshold. Against this, none of the T_3 statistics exceeded the 0.4614 threshold for the Ashton *et al.* (2004) density function. Furthermore, the median T_3 statistic for the Ioannidis *et al.* density function was 0.0993. Table 3 shows that the median T_3 statistic for the Ashton *et al.* density function was 0.0520. These statistics all support the hypothesis that the Ashton *et al.* density function provides a better fit to our debt to equity ratio data than does the Ioannidis *et al.* density function.

As further confirmation of the compatibility of our sample data with the Ashton *et al.* (2004) probability density function, $g(\gamma)$, we also applied a Kolmogorov goodness of fit test to each of the ninety fitted probability density functions. This test is *based* on the statistic, T_1, where (Kendall and Stuart, 1979, pp. 476–81):

$$T_1 = \max_{1 \le i \le n} \left| F(\gamma_i) - \frac{i}{n} \right| \tag{8}$$

or the maximum vertical distance between the empirical distribution function, $\frac{i}{n}$, and the fitted distribution function, $F(\gamma_i) = \int_0^{\gamma_i} g(\gamma)d\gamma$, for the i^{th} ordered debt to equity ratio based on the hypothesized values of the parameters *a*, *b* and *c*.[21] Here, Kendall and Stuart (p. 481) note that various authors have tabulated the distribution function of the Kolmogorov test statistic, T_1, given that the underlying data are generated by the hypothesized probability density function. These tables show that for the sample of $n = 32$ debt to equity ratios employed for each firm, there is only a 5 per cent probability that the test statistic, T_1, will exceed 0.2340. Now, for the empirical results summarized in Table 3 there is only one instance in which T_1 exceeds this threshold value of 0.2340. Given this, one can again be confident that the Ashton *et al.* density function, $g(\gamma)$, does in fact constitute a reasonable description of the way the debt to equity ratios on which our analysis is based, actually evolve.

The overall picture that emerges from our empirical analysis is that the Ashton *et al.* (2004) probability density function provides a satisfactory description of the way the debt to equity ratios of the mature firms examined in our study evolve over time. Furthermore, for the 'typical' firm the parameter *a* will be small, the parameter *b* will be large and negative and the parameter *c* will have a value of around four to six. Given this, in Figure 1 we plot the probability density function of the debt to equity ratio for a firm with the median parameter values (of $a = 0.0151$, $b = -267.72$ and $c = 4.8797$) summarized in Table 3. The modal value for this density function occurs when $\gamma = 0.99$ and so a firm with these parameter values is most likely to finance its operations with (approximately) equal amounts of debt and equity. Likewise, Figure 2 plots the probability density function of the debt to equity ratio for a firm with the lower quartile parameter values (of $a = 0.0033$, $b = -2{,}364.3857$ and $c = 2.5043$) summarized in Table 3. This probability density has a modal debt to equity ratio of $\gamma = 0.19$, something which indicates that the firm is most likely to finance its operations by using five times as much equity as it does debt. Finally, Figure 3 plots the probability density function of the debt to equity ratio for a firm with the upper quartile parameter values (of $a = 3.7474$, $b = -23.3400$ and $c = 7.6859$) summarized in Table 3. For this probability density the modal debt to equity ratio is $\gamma = 0.39$. This means that the most likely method

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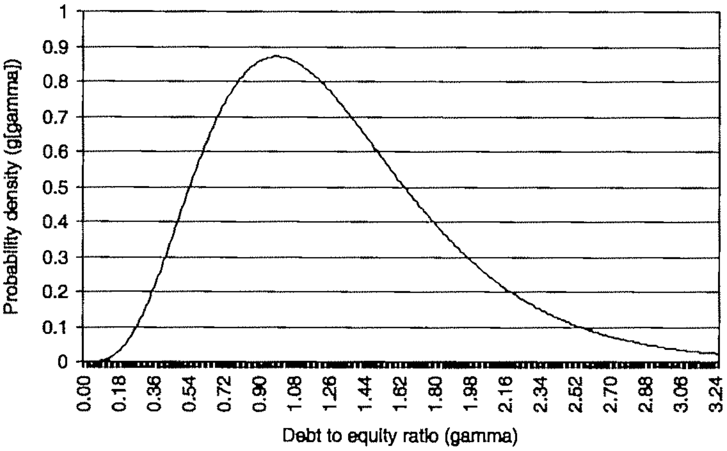
[21] Here we provide only a parsimonious description of the Kolmogorov test statistic. A more exact description of the test procedures can be found in the article by Stephens (1974).

FIGURE 1

PROBABILITY DENSITY OF DEBT TO EQUITY RATIO FOR A FIRM WITH MEDIAN PARAMETER VALUES

($a = 0.0151$, $b = -267.7191$, $c = 4.8797$)



The above figure is the graph of the probability density function:

$$g(\gamma) = \left[\frac{h}{a(1+\gamma)^2+1}\right]\cdot\left[\frac{\gamma}{\sqrt{a(1+\gamma)^2+1}}\right]^{c-1}\cdot\exp[\sqrt{a}(b-c)\tan^{-1}(\sqrt{a}(1+\gamma))]$$

with the parameters a, b and c assuming the median values summarized in Table 3.

of financing for firms with these parameters will be £5 of equity for every £2 of debt. Here, it is interesting to note that there are no apparent qualitative differences between all three of these graphs; in each case the probability density tends to rise gradually towards a modal value and then to fall away in a long (fat) tailed fashion consistent with the presence of outliers.

While Ashton *et al.* (2004, pp. 591–2) have little to say about the sign and magnitude of the parameters a and b in these graphs, they speculate that the parameter c will 'be close to, and perhaps a little more than, unity'. This argument is based on the subjective observation that in practice many firms finance their operations with only moderate amounts of debt and if this is to be reflected in the density function, $g(\gamma)$, then the parameter c will have to be 'reasonably' close to unity.[22] Here, however, Table 3 shows that for most of the firms on which our empirical analysis is based, the estimate of the parameter c is well in excess of this figure. Given this, we sought to test the Ashton *et al.* (2004) hypothesis by fixing the

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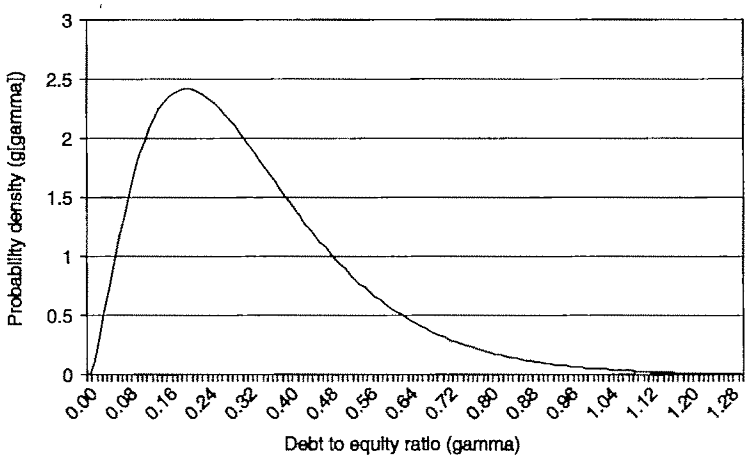
[22] Note that this is nothing more than a subjective observation on the part of Ashton *et al.* (2004, p. 592) and the mathematical and theoretical development of their model in no way hinges on c being close to unity. Indeed, the formal statement for the probability distribution given by Ashton *et al.* (2004, p. 589) requires only that $c > 0$ (see equation (6) above).

Figure 2

PROBABILITY DENSITY OF DEBT TO EQUITY RATIO FOR A FIRM WITH LOWER QUARTILE PARAMETER VALUES

($a = 0.0033$, $b = -2{,}364.3857$, $c = 2.5043$)



The above figure is the graph of the probability density function:

$$g(\gamma) = \left[\frac{h}{a(1+\gamma)^2+1}\right] \cdot \left[\frac{\gamma}{\sqrt{a(1+\gamma)^2+1}}\right]^{c-1} \cdot \exp[\sqrt{a}(b-c)\tan^{-1}(\sqrt{a}(1+\gamma))]$$

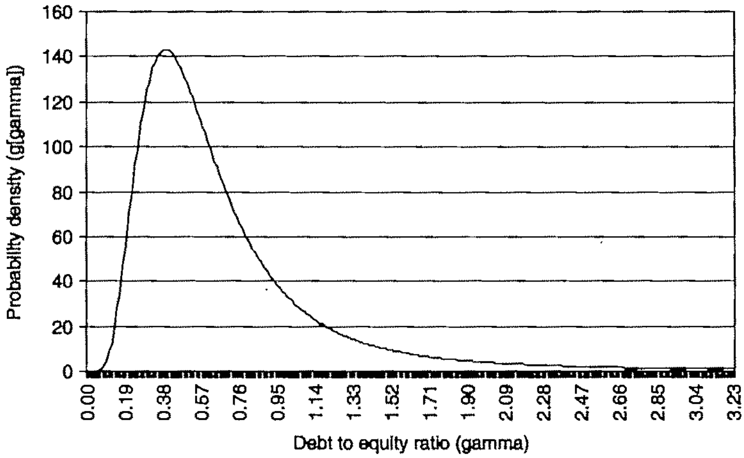
with the parameters a, b and c assuming the lower quartile values summarized in Table 3.

parameter c to (say) 1.5 and then determining the parameters a and b which minimize the Cramér–von Mises goodness of fit statistic, T_3. The results of this exercise are summarized in Table 4. This table shows that while constraining the parameter c to be 1.5 seems to have only a minor impact on the estimates obtained for the parameters a and b, the Cramér–von Mises and Kolmogorov goodness of fit statistics become much less compelling. Here the tables produced by Anderson and Darling (1952) show that if the debt to equity ratio is generated by the probability density function, $g(\gamma)$, with the hypothesized parameter values, then there is only a 5 per cent probability that the test statistic, T_3, will exceed 0.4614. However, when the parameter c is constrained to be 1.5, 23 out of a possible 90 or approximately 26 per cent of the Cramér–von Mises goodness of fit statistics exceed this threshold figure. Furthermore, comparing Table 3 with Table 4 shows that the median Cramér–von Mises test statistic increases from 0.0520 in the unconstrained case to 0.3219 in the constrained case. Likewise, under the null hypothesis that the debt to equity ratio is generated by the density function, $g(\gamma)$, with the hypothesized parameter values there is only a 5 per cent chance that the Kolmogorov goodness of fit statistic, T_1, will exceed 0.2340. However, when the parameter c is constrained to be 1.5, 26 out of a possible 90 or approximately

FIGURE 3

PROBABILITY DENSITY OF DEBT TO EQUITY RATIO FOR A FIRM WITH UPPER QUARTILE PARAMETER VALUES

($a = 3.7474$, $b = -23.3400$, $c = 7.6859$)



The above figure is the graph of the probability density function:

$$g(\gamma) = \left[\frac{h}{a(1+\gamma)^2+1}\right] \cdot \left[\frac{\gamma}{\sqrt{a(1+\gamma)^2+1}}\right]^{c-1} \cdot \exp[\sqrt{a}(b-c)\tan^{-1}(\sqrt{a}(1+\gamma))]$$

with the parameters a, b and c assuming the upper quartile values summarized in Table 3.

29 per cent of the Kolmogorov goodness of fit test statistics exceed this threshold figure. Comparing Table 3 and Table 4 also shows that the median Kolmogorov test statistic increases from 0.1065 in the unconstrained case to 0.1962 in the constrained case. Hence, these results indicate that in the very least, a significant proportion of the firms comprising our sample have parameter estimates that are incompatible with the subjective observation made by Ashton *et al.* (2004, pp. 591–2) that the parameter c will 'be close to, and perhaps a little more than, unity'.

IMPLICATIONS FOR EMPIRICAL WORK

Perhaps the most disturbing aspect of our empirical analysis is that it shows for the mature firms on which our sample is based, that the evolution of the debt to equity ratio is compatible with a probability density function which has no convergent moments. This has crucial implications for the ever growing volume of empirical work based on corporate debt ratios. Here Ashton *et al.* (2004, pp. 594–8) focus on bankruptcy prediction models which employ the debt to equity ratio as a discriminating variable and they note that these models normally assume that

TABLE 4

PARAMETER ESTIMATES (a AND b) AND GOODNESS OF FIT TEST STATISTICS (T_3 AND T_1) FOR THE PROBABILITY DENSITY, $g(\gamma)$ GIVEN THAT $c = 1.5$

Percentiles	a	b	T_3	T_1
Smallest observation	0.0004	–6,819.93	0.0460	0.0995
10	0.0009	–2,196.62	0.0764	0.1177
20	0.0016	–1,104.00	0.1194	0.1440
30	0.0024	–818.57	0.1603	0.1538
40	0.0043	–624.45	0.2130	0.1764
50	0.0051	–537.52	0.3219	0.1962
60	0.0065	–492.71	0.3674	0.2147
70	0.0077	–405.71	0.4243	0.2309
80	0.0262	–188.88	0.5499*	0.2527*
90	0.8231	–16.49	0.6744*	0.2672*
Largest observation	405.8588	–3.41	1.5678**	0.4069**
Inter-quartile range	0.0069	594.80	0.3402	0.0903

The first two columns of the above table summarize deciles of the parameter estimates for the probability density:

$$g(\gamma) = \left[\frac{h}{a(1+\gamma)^2+1}\right] \cdot \left[\frac{\gamma}{\sqrt{a(1+\gamma)^2+1}}\right]^{c-1} \cdot \exp[\sqrt{a}(b-c)\tan^{-1}(\sqrt{a}(1+\gamma))]$$

on the assumption that $c = 1.5$ across the 90 firms on which our empirical analysis is based. The last two columns summarize deciles of the Cramér–von Mises goodness of fit statistic, T_3, and the Kolmogorov goodness of fit statistic, T_1, across the 90 firms on which our empirical analysis is based again under the assumption that $c = 1.5$. * means the relevant statistic is significant at the 5% level; ** means the relevant statistic is significant at the 1% level.

all affected variables have convergent first and second moments.[23] However, debt ratios are also the focus of empirical research in a variety of other contexts, most notably in 'trade-off' theories of corporate financing employing the concept of a 'target' debt ratio (Shyam-Sunder and Myers, 1999; Booth *et al.*, 2001; Hovakimian *et al.*, 2004; Damodaran, 2005). Researchers in this area invariably model debt ratios in terms of a simple linear dynamic (target adjustment) model, again based upon the assumption of second order stationarity in the affected variables. Although the magnitude of the problems caused by the non-stationarity issues considered here will hinge on the exact specification used to estimate the target debt ratio, one can get a good idea of the difficulties which can arise by examining the procedures employed in the Shyam-Sunder and Myers paper.

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[23] Altman (1968) pioneered the use of bankruptcy prediction models using multivariate discriminant analysis. While in recent years logit analysis and neural networks have become the more predominant methods for predicting bankruptcy, in a recent survey article Bellovary *et al.* (2006, p. 1) note that discriminant analysis and neural networks are regarded as 'the most promising methods for bankruptcy prediction' in the literature.

Shyam-Sunder and Myers (1999) begin their analysis by noting that the dynamic (target adjustment) process for financial ratios is normally founded on the assumption that changes in the ratio are explained by deviations of the current ratio, $D(t)$, from the target ratio, $\bar{D}$. Given this, they employ the following 'base' line model for the debt ratio in their empirical analysis:[24]

$$dD(t) = a + b(\bar{D} - D(t))dt + dz(t), \tag{9}$$

where $D(t)$ is the ratio of long term debt to the book value of assets; $dD(t) = D(t + dt) - D(t)$ is the change in this debt ratio over the instantaneous interval from time t until time $t + dt$; $\bar{D}$ is approximated by the actual historical mean debt ratio, a and b are the parameters to be estimated and $dz(t)$ is a white noise process with variance parameter σ^2. One can determine the time series properties of the debt ratio by solving the above differential equation in which case we have:

$$D(t) - D(0) = (1 - e^{-bt})\left\{\left(\frac{a + b\bar{D}}{b}\right) - D(0)\right\} + \int_0^t e^{-b(t-s)}dz(s). \tag{10}$$

This result implies that (in expectations) the debt ratio will gradually converge towards $\frac{a + b\bar{D}}{b}$ and so if $\bar{D}$ is truly to be the target ratio, then the parameter a will have to be zero.[25] Furthermore, the speed with which the debt ratio converges towards its equilibrium value, $\bar{D}$, will depend on the magnitude of the (speed of adjustment or mean reversion) parameter b; higher values of b will mean that convergence occurs more quickly.

Now suppose we have a set of equally spaced debt ratios (say, $t = 1$ year apart) and that we follow Shyam-Sunder and Myers (1999) in using the classical regression model to estimate the parameters of the above dynamic (target adjustment) process:

$$\Delta D(t) = \alpha + \beta D(t)) + \varepsilon(t), \tag{11}$$

where $\Delta D(t) = D(t + 1) - D(t)$ is the increment in the debt ratio during the t^{th} year, $\alpha = \left(\frac{a + b\bar{D}}{b}\right)(1 - e^{-b})$ and $\beta = -(1 - e^{-b})$. Furthermore, the stochastic term, $\varepsilon(t)$, will be serially uncorrelated with a mean of zero and one can use Wiener's Theorem (Hoel *et al.*, 1972, pp. 142–4) to show that its variance will be $\mathrm{Var}_t[\varepsilon(t)] = \frac{\sigma^2}{2b}(1 - e^{-2b})$. This has the important implication that the dynamic (target adjustment) process has a unit root at the point $b = 0$ and statistical inference based on classical regression methods will be invalid (Dickey and Fuller, 1979; Peel *et al.* 2004). Given this, it is interesting to note that Shyam-Sunder and Myers (p. 233) report results based on the classical regression model which suggest that the simple (dynamic target) adjustment process given above provides 'some explanatory power for changes in debt ratios'. In particular, parameter estimates appear to be 'reasonable' and are 'statistically significant' from zero at any reasonable level of significance. However, since these significance tests are conducted under an hypothesis that encompasses a unit root in the dynamic (target adjustment) process, the *t* statistics associated with the parameter estimates are invalid and the estimated dynamic (target adjustment) models reported in the Shyam-Sunder and Myers paper may well be spurious.[26]

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[24] Here the Shyam-Sunder and Myers (1999) dynamic (target adjustment) process is formulated as a continuous time model. This is done both for analytical convenience and because variations in the debt ratios of the 'mature firms' on which their empirical analysis is based will be the outcome of 'thousands of small changes at random intervals of time on a single day...A realistic aggregate model which accurately takes account of the[se] microeconomic decision processes, must therefore, be formulated in continuous time' (Bergstrom, 1990, p. 1). However, the generality of the analysis which follows is not dependent on this assumption.

[25] Shyam-Sunder and Myers (1999, p. 228) report t statistics that are consistent with this requirement. However, their null hypothesis encompasses a unit root in the dynamic (target adjustment) process. This in turn implies that the stationarity assumptions of the classical regression model are violated and the t statistics reported by Shyam-Sunder and Myers are largely meaningless. This issue is expanded upon in the next paragraph.

A second issue stems from the point previously made that parameter estimates and even the functional form of the dynamic (target adjustment) regression model are highly dependent on the period between which observations of the debt ratio are made (Lo, 1988; Bergstrom, 1990; Chambers, 1999). Thus, if annual observations of the debt ratio are used, the classical regression model will provide estimates of $\alpha = \left(\frac{a + b\bar{D}}{b}\right)(1 - e^{-b})$ and $\beta = -(1 - e^{-b})$. However, if semi-annual observations of the debt ratio are used, the classical regression model will provide estimates of $\alpha = \left(\frac{a + b\bar{D}}{b}\right)\left(1 - \exp\left(-\frac{b}{2}\right)\right)$ and $\beta = -\left(1 - \exp\left(-\frac{b}{2}\right)\right)$. This means that one cannot simply take β as an estimate of the speed of adjustment (or mean reversion) coefficient as has often occurred in past empirical work based on target adjustment models of the kind considered here.[27] One can, of course, correct for the inconsistencies introduced by discretely sampled data and this shows that β is likely to provide a poor estimate of the speed of adjustment coefficient, b. Here, Shyam-Sunder and Myers (1999) provide estimates of β that vary between –0.25 and –0.4 depending on the estimation procedure employed. Taking the midpoint of these estimates implies that a rough estimate of the speed of adjustment coefficient will be $b = -\log(1 - \beta) = -\log(1 - 0.33) = 0.40$. Thus the estimated speed of adjustment coefficient, $b = 0.40$, is about 20 per cent larger than the regression coefficient, $\beta = 0.33$, from which it is computed. The regression coefficient, α, will also provide an inconsistent estimate of the equilibrium value for the debt ratio, $\bar{D}$, although considerations of space mean that we do not develop this further here.

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[26] To further emphasize the point being made here three versions of the Dickey and Fuller (1979) test are applied to the debt to equity ratios of each of the ninety firms on which the empirical analysis is based. The first of these assumes that the debt to equity ratio is generated by a pure random walk. Under this specification, 83 (from a possible 90) firms returned a Dickey-Fuller τ statistic compatible with the existence of a unit root (at the 5 per cent level of significance). The second version of the Dickey–Fuller test assumes that the debt to equity ratio is generated by a random walk with drift. For this specification, 76 firms returned a τ statistic compatible with the existence of a unit root (again, at the 5 per cent level of significance). The third test assumed that the debt to equity ratio is generated by a random walk around a stochastic trend. For this specification, 83 firms returned a τ statistic compatible with the existence of a unit root. Hence, all three Dickey–Fuller tests suggest that for the large majority of firms in our sample, the debt to equity ratio possesses a unit root and therefore does not possess a convergent second moment.

[27] Again one should consult the article by Brailsford and Maheswaran (1998, p. 215) and the articles to which it refers for several examples of where this has been done in the past. Sims (1987, p. 64) gives some simple numerical examples that demonstrate the seriousness of this problem.

Our final point stems from the previously made observation that the restrictions imposed by the double entry bookkeeping system will mean that the debt ratio analysed in the Shyam-Sunder and Myers (1999) paper cannot exceed unity or fall below zero. However, one can again invoke the procedures summarized in Ashton *et al.* (2004, pp. 599–603) to show that the probability density function, $g(D)$, of the debt ratio for the linear dynamic (target adjustment) model employed by the Shyam-Sunder and Myers study will take the following form:

$$g(D) = \sqrt{\frac{b}{2\pi\sigma^2}} \cdot \exp\left[\frac{-b(\bar{D} - D)^2}{2\sigma^2}\right]. \tag{12}$$

This shows that there is a non-trivial probability that under this simple linear adjustment model the debt ratio can in fact either become negative or exceed unity.[28] Furthermore, we have previously noted that Ashton *et al.* (2004) show that these restrictions imposed by the double entry bookkeeping system will mean that the evolution of a firm's debt ratios will be compatible with a complicated non-linear (target adjustment) process whose underlying density function has no convergent moments. We are thus confronted with the thorny issue of the integrity of conclusions reached from empirical results based on the apparently mis-specified modelling procedures implied by the simple linear (target adjustment) process. Some useful insights into this matter can be obtained by considering a simple example that reflects the kind of processes that describe the evolution of corporate debt ratios under the Ashton *et al.* (2004) model of the firm.[29]

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[28] We also estimated the parameters of this simple linear target adjustment probability density function by minimizing the Cramér–von Mises goodness of fit statistic using the thirty-two debt to equity ratios available for each of the ninety firms on which our empirical analysis is based. Here it will be recalled that if the debt to equity ratio is generated by the given distributional form then there is only a 5 per cent probability that T_3 will exceed 0.4614 (Anderson and Darling, 1952, p. 203). However, for the linear target adjustment probability density function given here, eleven of the ninety firms in our sample returned Cramér-von Mises T_3 statistics that exceeded this 0.4614 threshold. Against this, Table 3 shows that no firms returned a T_3 statistic that exceeded this 0.4614 threshold for the Ashton *et al.* (2004) density function. Furthermore, Table 3 also shows that the median T_3 statistic across our ninety firms for the Ashton *et al.* density function is 0.0520. This compares with a median T_3 statistic for the linear target adjustment probability density function of 0.1364. These statistics all support the hypothesis that the Ashton *et al.* density function (and the non-linear adjustment mechanism on which it is based) provides a better description of the way the debt to equity ratio evolves than the simple linear adjustment mechanism that gives rise to the above probability density function.

Consider then a standardized normal variate, x. Let a second variable, y, be deterministically related to x through the formula $y = x^3 + x^2 - 3x$. Now, one can compute the Pearson product moment correlation coefficient between x and y in which case we have $\frac{\mathrm{Cov}(x;y)}{\sigma(x)\sigma(y)} = \frac{E[(x - E(x))(y - E(y))]}{\sigma(x)\sigma(y)} = \frac{E(x^4 + x^3 - 3x^2)}{\sigma(x)\sigma(y)} = 0.$[30] Hence, although there is an exact functional (cubic) relationship between x and y the correlation coefficient (between them) is zero. Likewise, if the debt ratio converges towards its equilibrium value in accordance with a non-linear adjustment mechanism, it is all but inevitable that a linear regression of increments in the debt ratio on the debt ratio itself will return less than compelling evidence of a relationship between the two variables. In other words, a plausible explanation for the poor results summarized by Shyam-Sunder and Myers (1999) for the simple linear targeting model is that it is a mis-specified representation of the way the debt ratio actually evolves over time.[31] Added to this is the fact that both the Ashton *et al.* (2004) model of the double entry bookkeeping system and our

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[29] One can employ the proportionate growth assumptions and other procedures summarized in the Ashton *et al.* (2004) paper to show that the debt ratio, $v(t)$, as defined in the Shyam-Sunder and Myers (1999) empirical analysis will evolve in terms of the following stochastic differential equation:

$$dv(t) = [(\sigma_{12}^2 + \mu_{12} - \mu_{13})v(t) - \mu_{23}v(t)(1 - v(t)) - \sigma_{23}^2 v^2(t)(1 - v(t))]dt \\ + (\sigma_{12}dz_{12}(t) - \sigma_{13}dz_{13}(t))v(t) - \sigma_{23}v(t)(1 - v(t))dz_{23}(t),$$

where, as in the case of previous analysis, the μ_{jk} are instantaneous expected growth rates associated with the firm's bookkeeping variables, the σ_{jk}^2 are their associated variances and the dz_{jk} are standard Gauss-Wiener processes. Unfortunately, no closed form solution is available for this differential equation and so, the appropriate form of the regression equation of increments in the debt ratio against the debt ratio itself, is also not known. Note, however, that the mean of instantaneous increments in the debt ratio is a polynomial of order three and this has particular relevance to the example which follows.

[30] The $(2k)^{\text{th}}$ moment, $E(x^{2k})$, (for k integral) of the standard normal distribution can be retrieved from formula $E(x^{2k}) = \frac{(2k)!}{2^k k!}$ while for all odd moments, $E(x^{2k+1}) = 0$ (Freeman, 1963, p. 139). Substitution into this formula shows $E(x^2) = 1$, $E(x^3) = 0$ and $E(x^4) = 3$ or that $E(x^4 + x^3 - 3x^2) = 0$ as claimed in the text.

[31] The following ordinary least squares regression was run in order to check whether this might be true if the simple linear target adjustment model is applied to the debt to equity ratios on which our empirical analysis is based (Shyam-Sunder and Myers, 1999, p. 226):

$$\Delta D(t) = a + b(\bar{D} - D(t)) + \varepsilon(t).$$

Here $D(t)$ is the median debt to equity ratio at the beginning of year $t = 1, 2, 3, \_\_, 32$ as summarized in Table 2, $\Delta D(t) = D(t+1) - D(t)$ is the increment in the median debt to equity ratio over the t^{th} year, $\bar{D}$ is the median debt to equity ratio across all ninety firms and thirty-two years, a and b are the parameters to be estimated and $\varepsilon(t)$ is the stochastic error term applicable to the t^{th} year. This procedure returned an estimate for the parameter a of 0.0038 with an insignificant t statistic of 0.49. The estimate of the parameter b was 0.1519, again with an insignificant t statistic of 1.36. The (unadjusted) R-square for the regression was 0.06. Based on these results one could reject the hypothesis that the debt to equity ratio evolves in terms of a dynamic target adjustment process. Yet the empirical analysis summarized above returns compelling evidence that the debt to equity ratio evolves in terms of a much more complicated non-linear target adjustment process.

empirical analysis (based upon it) show that there are plausible reasons for believing that the stationarity assumptions on which these linear targeting models are based may not hold up in practice. If this is so, then the conventional parameter estimation procedures will be inconsistent and temporally unstable.

CONCLUDING REMARKS

The purpose here is to assess empirically the quasi-supply side model of the firm developed in the paper by Ashton *et al.* (2004) by testing the prediction of the model that a firm's debt to equity ratio will evolve in terms of a probability density function having no convergent moments. Using a thirty-two-year history of the debt to equity ratio for each of ninety United Kingdom firms, we employ a non-parametric estimation procedure which shows that the evolution of the debt to equity ratio is largely compatible with the Ashton *et al.* (2004) model's predictions. In particular, the debt to equity ratio is compatible with a probability density function with no convergent moments, something that has important implications for empirical work that is based upon it. If, for example, one adopts the standard textbook approach of 'controlling' the debt to equity ratio for the effects of other financial variables by using multivariate regression procedures (Damodaran, 2005, pp. 383–5), then all parameter estimates may be inconsistent and intertemporally unstable.

A subsidiary objective arising out of this analysis is to examine the role played by dynamic (target adjustment) processes in shaping the distributional and time series properties of financial ratios. Our empirical analysis shows that serious mis-specification problems can arise when one models the dynamic (target adjustment) process for the debt to equity ratio in terms of a simple linear mean reversion process. If, as the Ashton *et al.* (2004) model of the double entry bookkeeping system suggests, the evolution of the debt to equity ratio is compatible with a non-linear (target adjustment) process whose underlying density function possesses no convergent moments, then it is all but inevitable that the linear specifications of the adjustment process normally found in the literature will perform poorly. This is borne out by the data on which our own empirical analysis is based. Thus, the Ashton *et al.* probability density function provides a satisfactory fit to the empirical distributions of the debt to equity ratios of all but one or two of the ninety firms comprising our sample. This, in turn, is consistent with the hypothesis that the evolution of the debt to equity ratio is compatible with a non-linear dynamic (target adjustment) process and, given this, one should not be too surprised when tests of the conventional linear adjustment process perform poorly—as they do on the debt to equity ratios of our own sample of firms.

The techniques advanced here also have potentially important applications in financial statement analysis. If, for example, one has estimated the probability density of the debt to equity ratio for a particular firm, then it is possible to assess whether the debt to equity ratio is within 'historical bounds' at any particular time. Thus, for the 'lower quartile firm' in our sample whose probability density function has the parameters $a = 0.0033$, $b = -2{,}364.3857$ and $c = 2.5043$, there is approximately one chance in twenty that one would expect to see a debt to equity ratio which falls below $\gamma = 0.07$. Likewise, there is only one chance in twenty that one would expect to see a debt to equity ratio for such a firm that lies above $\gamma = 0.72$. This is potentially valuable information for those who have financial dealings with the firm (such as banks and creditors) because a relatively high debt to equity ratio is often a precursor to the firm running into financial difficulties. Information like this can also be of interest to financial analysts; for example, a relatively low debt to equity ratio can indicate that the firm may not be making optimal use of debt in its mix of financing.

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Optimal Smoothing of Profit Via Overhead Allocation

Income smoothing, as defined in Statistical Activity Cost Theory (SACT), is the rational statistical adjustment of periodic accounting earnings to reduce their time volatility around average long-term profit per period. This article demonstrates how overhead cost allocations can be applied to smooth accounting earnings optimally in accordance with this definition. Such an approach parallels earlier work, such as that by Lane and Willett (1997, 1999), in which a depreciation formula was derived and applied for this purpose. In particular, it is shown that, to realize an income smoothing effect in profit making firms, the usual optimal strategy is to over-allocate costs, giving support to the accounting principle of conservatism.

Key words: Accounting; Allocation; Conservatism; Measurement; Overhead; Theory.

Accounting standards, such as International Accounting Standards Board's IAS 2, *Inventories* (2.10), Australian Accounting Standards Board's AASB 1019, *Inventories*, and SSAP 9 (U.K.), *Stocks and Long-Term Contracts*, require the allocation of overhead costs. Accordingly, the valuation of inventories should include conversion costs, which may include allocated fixed manufacturing overhead costs. This article examines whether these types of allocations, referred to as 'cross-sectional'[1] overhead cost allocations, have a useful purpose in improving estimates of long-term profitability. The approach taken draws on that of Lane and Willett (1997, 1999), which discusses the use of depreciation ('time-series' allocations) in a similar context.

The question of how to allocate overhead cost has always been controversial. Several approaches have been suggested: (a) Benefit received approaches such as physical quantity cost allocation method or activity based costing; (b) Market value approaches which often involve allocating costs in proportion to the selling prices of each product; and (c) Game theory cost allocations characterized by the works of Balachandran and Ramakrishna (1981) or Mirman *et al.* (1985).

[1] Cross-sectional cost allocation is cost allocation within the same period of time, while time-series cost allocation is cost allocation across different accounting periods (e.g., depreciation).

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Irrespective of the approach taken, to make cost allocation defensible (Thomas, 1969), it is necessary to clearly define the goal of the cost allocations and uphold an objective measure on the success of the cost allocation in achieving that goal.[2] A fundamental problem with cost allocations is that the goals of cost allocations are often too broad and not sufficiently defined. For example, if the purpose of the cost allocation is to reflect the amount of benefit received in consuming an overhead resource, why would a physical quantity allocation method be a better or worse strategy than activity based costing? A more refined activity based costing may indeed be more sophisticated in breaking down the manufacturing process into detailed cost pools. However, without an objective way of measuring how well cost allocation captures the amount of benefit received, it is in general not possible to determine which cost allocation is better.

In the light of these problems, a different approach is adopted here. It seeks to find a cost allocation scheme that will minimize the volatility of periodic earnings under uncertainty, extending an approach used to analyse the effect of the matching principle in Su (2005). In this manner, the success of cost allocation is measured by its ability to lower the statistical variance of accounting earnings over time. Minimizing the volatility of periodic earnings can thereby improve the information quality of organizations internally, allowing them better to predict average long-term earnings.

The statistical earnings smoothing properties of overhead cost allocations have not previously been analysed in any depth in the accounting literature. The approach taken here extends Lane and Willett (1997, 1999), Gibbins and Willett (1997), Willett (1987, 1988, 1991) and Su (2005). These sources provide the fundamental motivation and background for the technical developments outlined and discussed below.

LITERATURE REVIEW

Gibbins and Willett (1997) briefly considered the potential of using the matching principle to smooth earnings and discussed cross-sectional cost allocations generically. This approach was developed by Su (2005) to examine of the effect of matching on income smoothing by applying a multinomial model using Willett's (1987, 1988, 1991) Statistical Activity Cost Theory (SACT). Here, the approach is further extended, by developing an approximate mathematical model that provides a foundation for the statistical analysis of overhead cost allocations.[3]

To mimic the real world, it is necessary to model accounting numbers under uncertainty. The SACT approach is to analyse economic processes as sets of activities with random costs, start times and duration times. A *class* of activities consists of all activities with the same statistical distributions governing these parameters. For example, an activity class might consist of activities with start times generated from the Uniform(0,3) distribution, finish times generated from the Uniform(5,6) distribution, and costs generated from the Normal(100,2) distribution. Using this framework, Lane and Willett (1997, 1999) demonstrate how depreciation could be used to reduce the volatility of earnings over time and thereby to improve the long-term profit estimation of the firm.

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[2] Thomas (1982) summarized this line of reasoning.

[3] For background information on SACT see Gibbins and Willett (1997). This contains a full account of the principles of SACT and references to the origins of SACT in the accounting literature.

The principle concern in the current work is to examine the impact on the volatility of earnings when overhead costs are allocated to products (interpreted as activities that produce those products) in proportion α_j, for $j = 1,2,3 \ldots m$ products. Paralleling the study of depreciation in Lane and Willett (1999), the objective of the present analysis is to find the value of α_j that minimizes the error of periodic earnings as an estimate of long-term profitability.

METHOD

This section details the techniques that can be used to analyse cost allocations by mathematical means. The strategy to analyse the cost allocation scenario is first illustrated with a simple numerical example followed by mathematical results which forms the basis of the analysis discussed later.

Numerical Example

To model those situations where cross-sectional cost allocation can induce a variance reduction effect, it is useful to extend the concepts of matched and unmatched earnings developed in Su (2005). The essential idea is that the mechanism of allocating overhead costs can be modelled by a series of matched and unmatched earnings calculations.

The concept of *matched earnings* is based upon typical accrual accounting practice. It applies the matching principle by identifying physical inputs with physical outputs and then matching the expenses revenues associated with those inputs and outputs to calculate earnings. In the case of *unmatched earnings*, expenses and revenues are entered in the accounting period in which they occur, without applying the matching principle, akin to the traditional concept of pure funds flow accounting.

Su (2005) demonstrated that applying the matching principle in accounting can often smooth earnings in the sense of reducing its volatility relative to its long-run mean value. The issue to be addressed here and the way cost allocations are characterized can be illustrated by extending the example in Su (2005) to cover allocations of overhead costs. The example assumes that a particular product incurs a cost of \$5 for inputs in period 2 and is sold in period 4 for –\$10.[4] The

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[4] By convention, revenues are negative quantities. If assets are thought of in 'positive terms' then expenses will also be positive and revenues must be negative. This system is also adopted in Cooke and Tippett (2000).

TABLE 1

AN ILLUSTRATION OF MATCHED AND UNMATCHED COSTS

	Period 1	Period 2	Period 3	Period 4	Sample variance
Matched profit	0	0	0	–5	6.25
Unmatched profit	0	5	0	–10	39.58

Actual earnings per period: $-1.25 = \frac{-5}{4}$, a gain of \$1.25 per period.

Sample variance for matched profit: $6.25 = \frac{3 \times (1.25)^2 + (-5 + 1.25)^2}{3}$

Sample variance for unmatched profit: $39.58 \approx \frac{2 \times (1.25)^2 + (5 + 1.25)^2 + (-10 + 1.25)^2}{3}$

calculation of matched and unmatched earnings over the four periods and their respective volatilities (time variances) are shown in Table 1.

A lower earnings volatility will often lead to a more reliable estimate of the longer run average earnings. For example, by period 2, matched and unmatched earnings will give 2.5 and 0 respectively as estimates for the overall, long-run average earnings per period of –\$1.25. The estimation under matched earnings is closer to the long-run value, on average, than the unmatched earnings due to the fact that matched earnings has lower earnings volatility.

In practice, two different situations arise in making cost allocations. In the first, information is unavailable to match revenues and expenses in the manner shown in Table 1 even though there may be an underlying, but unknown, cause and effect relation between inputs and outputs. In the second situation, either there is no real cause and effect relation underlying the inputs and outputs or it is difficult to attribute, such as the contribution of a long-lived machine to the production of particular items of output. In both cases, accountants may resort to overhead cost allocations to support various types of decision or to accommodate recommendations in the accounting standards, as noted earlier. The general framework described in this paper is applicable to analysing both of these cases but the models and results reported later focus on the first situation, that is, the imperfect information scenario where matching or tracing is considered possible but the required information and the time to gather it is lacking.

Table 2 illustrates the interpretations of cost allocations as weighted averages of matched and unmatched earnings. It shows the situation in which 90 per cent of the actual expenses incurred in period 2 are correctly identified and matched with the selling price of the product in period 4. The remaining expenses incurred are written off in period 2, that is, as unmatched expenses. The effect of this procedure on the periodic earnings is shown in Table 2.

Table 2

AN ILLUSTRATION OF MATCHING ONLY 90% OF THE COSTS

	Period 1	Period 2	Period 3	Period 4	Sample variance
90% matched (α)	0	0	0	–5.5	
10% unmatched ($1 - \alpha$)	0	0.5	0	0	
Earnings	0	0.5	0	–5.5	8.08

By changing α, the *allocation coefficient*, different income smoothing effects, measured by the sample variance of earnings (8.08 in the example given in Table 2), can be observed. In the context of an imperfect information scenario therefore, the allocation coefficient can be interpreted as a measure of the accuracy with which information about the cause and effect relationship between expenses incurred and revenue earned is recovered by an allocation scheme. Much of what is claimed in the literature about the usefulness of activity-based allocations of costs and the relevance of cost drivers in the ABC literature implies this kind of interpretation. The central issue investigated in here is whether there are some choices of α that would improve the variance reduction of earnings in situations where earnings are not known in advance but fluctuate according to a probability law. If so, overhead cost allocations may have a statistical function in improving the estimation of long-term profitability.

The remainder of this section provides the basic conditions, expressed as a set of linear equations, for determining the value of the allocation coefficient that minimizes the variance of the earnings calculation, depending upon the parameters of the distributions of the activity cost class—that is, costs, start times and duration times. The analysis assumes that the start and duration times of the activities are statistically independent of the costs of the activity class.[5]

Basic Conditions for Optimizing the Allocation Coefficient α

To find the optimal coefficient α for the situation described in Table 2, for k accounting periods and n activities, while additionally allowing activities to start and finish according to a probabilistic law, the formula for the expected sample variance (ESV) of unmatched earnings in Su (2005, p. 10)[6] is adapted, using the fact that the covariance between two activity classes with n expense and s revenues is $nsE(X)E(Y)\left(r - \frac{1}{k}\right)$ (notation explanations to follow). In this paper, X_j, Y_j and α_j are the expenses, revenues and allocation coefficient of the j^{th} activity class and Γ_j is the allocated periodic earnings over k periods for activity class j. When conducting cost allocations, a proportion of expense is allocated to revenue and this amount (namely Z) is usually recognized at the finish time of an activity (e.g., when the product is sold). Mathematically, this is expressed as $Z_j = \alpha_j X_j + Y_j$. Then, any amount that is not allocated is usually written off as soon as it is recognized (e.g., at the time of cost allocation if known). This is expressed as $W_j = (1 - \alpha_j)X_j$. With these notations, the expected sample variance of accounting earnings after cost allocation, $E(\mathrm{Var}(\Gamma_j))$ is shown in (1).

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[5] This assumption parallels that of free competition in open markets in economic theory. It implies that individual buyers and sellers cannot affect market prices. If the assumption fails the results can be extended to the more general case at the cost of additional mathematical complexity. Goodman (1960) contains the necessary mathematical developments.

$$\frac{kE(\mathrm{Var}(\Gamma_j))}{k-1} = \frac{n_j\begin{bmatrix}\mathrm{Var}(X_j) + \mathrm{Var}(Y_j) + \\ \left(1 - p_j + n_j p_j - \frac{n_j}{k}\right)(1-\alpha_j)^2(E(X_j))^2 + \\ \left(1 - q_j + n_j q_j - \frac{n_j}{k}\right)(a_j E(X_j) + E(Y_j))^2 + \\ 2n_j(\alpha_j E(X_j) + E(Y_j))(1-\alpha_j)E(X_j)\left(r_j - \frac{1}{k}\right)\end{bmatrix}}{k-1}, \qquad (1)$$[7]

where n_j is the number of activities for activity class j and $p_j = \sum_{i=1}^{k} p_{ij}^2$, $q_j = \sum_{i=1}^{k} q_{ij}^2$, $r_j = \sum_{i=1}^{k} p_{ij}q_{ij}$.

To calculate the aggregate sample variance of earnings for m activity classes the covariance of earnings between each adjacent activity class has to be added to (1). For two adjacent activity classes j and h, where $j \neq h$, the expected sample covariance of earnings between the two activity classes is shown in (2).

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[6] As stated in Su (2005), the formula presented here is approximate rather than exact for easy exposition of mathematical results. The exact formula for expected sample variance can be found in Su (2006) and the same procedure in this paper can be applied to obtain the optimal α. The approximate formula treats the sample mean as a good proxy for population mean and this is in fact a condition for optimization to work well, so for the sake of simplicity, the approximate formula is used here.

[7] The adjustment $k/(k-1)$ in the formula reflects that it is a sample variance and not the population variance that is being dealt with here.

$$\frac{kE(\mathrm{Cov}(\Gamma_j,\Gamma_h))}{k-1} = \frac{n_h n_j \left(\begin{aligned} &(\alpha_j E(X_j) + E(Y_j))(\alpha_h E(X_h) + E(Y_h)) \left[\left(\sum_{i=1}^{k} q_{ij} q_{ih} \right) - \frac{1}{k} \right] \\ &+ (\alpha_j E(X_j) + E(Y_j))((1-\alpha_h)E(X_h)) \left[\left(\sum_{i=1}^{k} p_{ih} q_{ij} \right) - \frac{1}{k} \right] \\ &+ ((1-\alpha_h)E(X_h))((1-\alpha_j)E(X_j)) \left[\left(\sum_{i=1}^{k} p_{ij} p_{ih} \right) - \frac{1}{k} \right] \\ &+ ((1-\alpha_j)E(X_j))(\alpha_h E(X_h) + E(Y_h)) \left[\left(\sum_{i=1}^{k} p_{ij} q_{ih} \right) - \frac{1}{k} \right] \end{aligned} \right)}{k-1} \tag{2}$$

Equations (1) and (2) give the necessary formulae for calculating the aggregate sample variance of earnings for m activity classes. The result is given in expression (3).

$$\frac{k}{k-1} E\left(\mathrm{Var}\left[\sum_{j=1}^{m} \Gamma_j \right] \right) = \sum_{j=1}^{m} \frac{kE(\mathrm{Var}(\Gamma_j))}{k-1} + \sum_{j \neq h} \frac{kE(\mathrm{Cov}(\Gamma_j,\Gamma_h))}{k-1} \tag{3}$$

To find the minimum for expression (3), differentiate with respect to α_j and set the result equal to zero. This produces the set of linear equations in (4), which can be solved using the Gaussian elimination technique (Gentle, 1998). Expression (4) provides the necessary condition to find an α_j that minimizes $\frac{k}{k-1} E\left(\mathrm{Var}\left[\sum_{j=1}^{m} \Gamma_j \right] \right)$.

$$\begin{aligned} \alpha_j &= \sum_{j \neq h} \frac{AE(X_j) + BE(Y_j) + n_h \alpha_h E(X_h) C + n_h E(X_h) D + n_h E(Y_h) F}{2[2 + n_j p_j + n_j q_j - p_j - q_j - 2 n_j r_j] E(X_j)} \\ A &= 2(1 + n_j p_j - p_j - n_j r_j) \\ B &= -2(1 + n_j q_j - q_j - n_j r_j) \\ C &= \sum_{i=1}^{k} (-q_{ij} q_{ih} + p_{ih} q_{ij} - p_{ij} p_{ih} + p_{ij} q_{ih}) \\ D &= \sum_{i=1}^{k} (p_{ij} p_{ih} - p_{ih} q_{ij}) \\ F &= \sum_{i=1}^{k} (-q_{ij} q_{ih} + p_{ij} q_{ih}) \end{aligned} \tag{4}$$

ANALYSIS

This section illustrates the behaviour of the optimum allocation coefficient in the case of one and two activity classes with and without the constraint that $\alpha_j \geq 0$. Allocating when $\alpha_j < 0$ can be interpreted as allocating revenue in advance. Some accounting standards such as IAS 11, *Construction Contracts*, allow revenues to be anticipated in advance if the outcome of the contract can be measured reliably.

In all cases considered here, analytic solutions are provided for one activity class. For two or more activity classes, however, an active set quadratic programming numerical method is used (Wolfe, 1959). In general, where a large number of activity classes is involved, it may be quicker to use numerical analysis rather than to evaluate the exact theoretical result. As an alternative, it is possible to use the EXCEL Spreadsheet Solver Macro, by setting the objective function (expression (3)) as a least square problem and allow the solver to minimize this quantity.

The section is divided into four parts. The first discusses the behaviour of the value of the allocation coefficient relative to the ESV of earnings and to earnings in the context of one activity class. The second notes the same relationships in the context of two activity classes and also the relationship between the allocation coefficients in the two different classes. The third and fourth compare the impact of allocation, matching and no-matching on the ESV of earnings, the latter analysing the effect of applying the three different approaches to earnings measurement to the estimation of long-run profit.

Table 3 shows the parameters for the two activity classes considered here. In activity class 1, there are 1,000 activities and 12 accounting periods. The probability that expenses will occur in each of periods 1 to 12 is 1/12. Similarly, revenues occur in periods 1 to 12 with probabilities as specified in the finish time parameters

TABLE 3

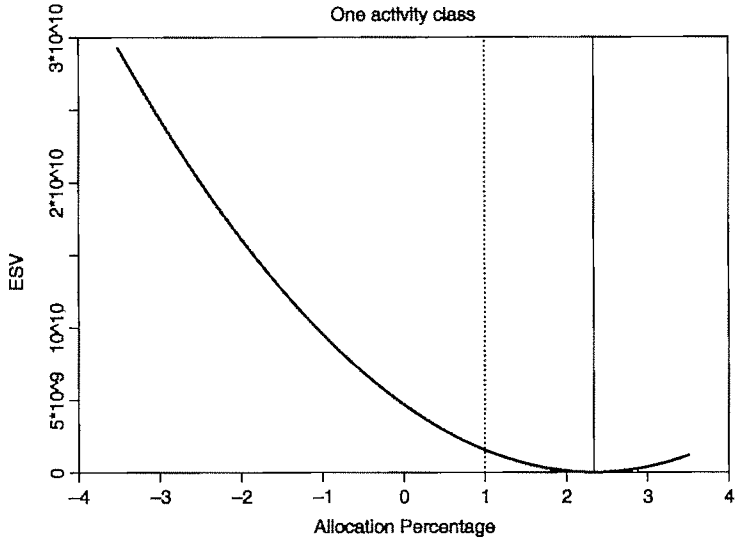
PARAMETERS OF TWO ACTIVITY CLASSES CONSIDERED IN THE THEORETICAL ANALYSIS

	Activity class 1	Activity class 2
No. of activities	1000	1500
Start time parameters	MN[a] $(1000, p_i = 1/12)$ $i = 1 \ldots 12$	MN(1500,0.086,0.086, 0.108,0.072,0.065, 0.086,0.108,0.086, 0.065,0.072,0.115,0.051)
Finish time parameters	MN(1000,0.0036, 0.0112,0.0196, 0.0289,0.0393, 0.0513,0.0653, 0.0820,0.1033,0.1318, 0.1763,0.2874)	MN(1500,0.004,0.014, 0.022,0.035,0.032, 0.058,0.109,0.073, 0.087,0.120,0.187,0.259)
Expense	Uniform[300,400]	Uniform[200,300]

[a] MN refers to multinomial distribution.

FIGURE 1

OPTIMAL SMOOTHING INCOME VALUES OF A FOR ACTIVITY CLASS 1



The lowest ESV is attained at 2.340971. The revenue and expense parameters considered in this case are respectively U[−950,−700] and U[300,400].

shown in Table 3. To allow examination of different profitability levels, expenses are generated from a Uniform[3,21] distribution with different levels of revenue. At the first profitability level, revenues are generated from the Uniform[−42,−6] distribution. In the next level, revenues are generated from the Uniform[−41.58,−5.94] distribution. This process is repeated in decreasing steps of equal amount, until a level of zero revenue is reached.

Behaviour of α in One Activity Class

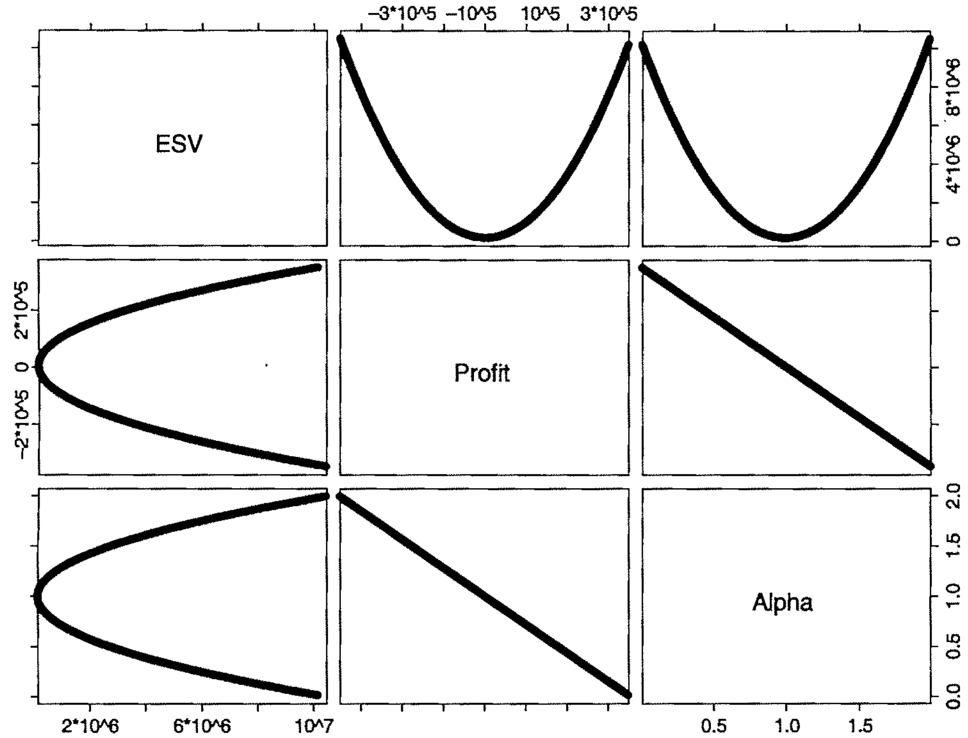
The analysis of a single activity is straightforward. It involves differentiating expression (4) with respect to α and setting the result equal to zero. This solution gives the value of α that provides the minimum ESV value. In the case of $\alpha < 0$, the optimum ESV value is achieved at $\alpha = 0$.

Figure 1 exhibits different values of α on the x axis and the ESV values on the y axis. The optimal value of α is indicated by the vertical line at 2.34. The results show that, given the random properties of activity class 1, on average the optimum income smoothing effect is achieved by over-allocating expenses by 234 per cent.

This result shows that a precise matching of expenses with revenue earned (the dashed line in Figure 1) does not provide the minimum ESV value unless the allocation percentage is constrained to [0,1]. Nevertheless, exact matching does

FIGURE 2

OPTIMAL INCOME SMOOTHING ANALYSIS FOR ONE ACTIVITY CLASS FOR DIFFERENT LEVELS OF PROFITABILITY



provide one of the lower ESV values. Over-allocating expenses will not, however, always result in the minimal ESV. The optimum level of the α coefficient is in general dependent on the parameters of an activity class.

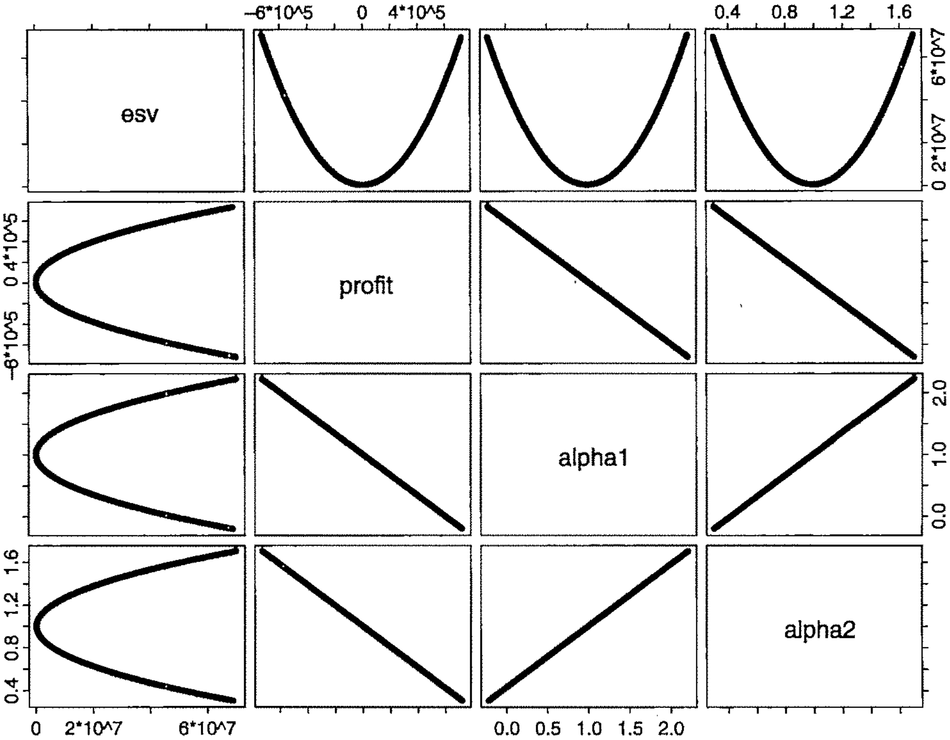
The effect of changing the level of profitability by changing the revenue parameters is shown in Figure 2. The top graph in the middle panel shows the relationship between ESV on the y axis and profitability level on the x axis. Similarly, the bottom graph in the middle panel shows the relationship between α on the y axis and profit on the x axis. The exact straight line relationship between profitability and the optimal value of the α coefficient is caused by changing revenues to achieve different levels of profitability and would not necessarily hold if, for example, different levels of profitability were obtained by changing the expense parameters and fixing the revenue parameters.

Behaviour of α in Two Activity Classes

Figure 3 and Figure 4 show the relationships between the ESV values, profit, and the α coefficients for two activity classes. This analysis considers the application of

FIGURE 3

UNCONSTRAINED MINIMIZATION OF ESV FOR TWO ACTIVITY CLASSES



the constraint $\alpha_j \geq 0$ for $j = 1,2$. The introduction of this constraint produces the kink observed in Figure 4. If the value of α_j is not constrained, then no kink will appear as shown in Figure 3. The linear relationship between the optimal α_1 and α_2 values in Figure 3 is a direct result of equation (4).

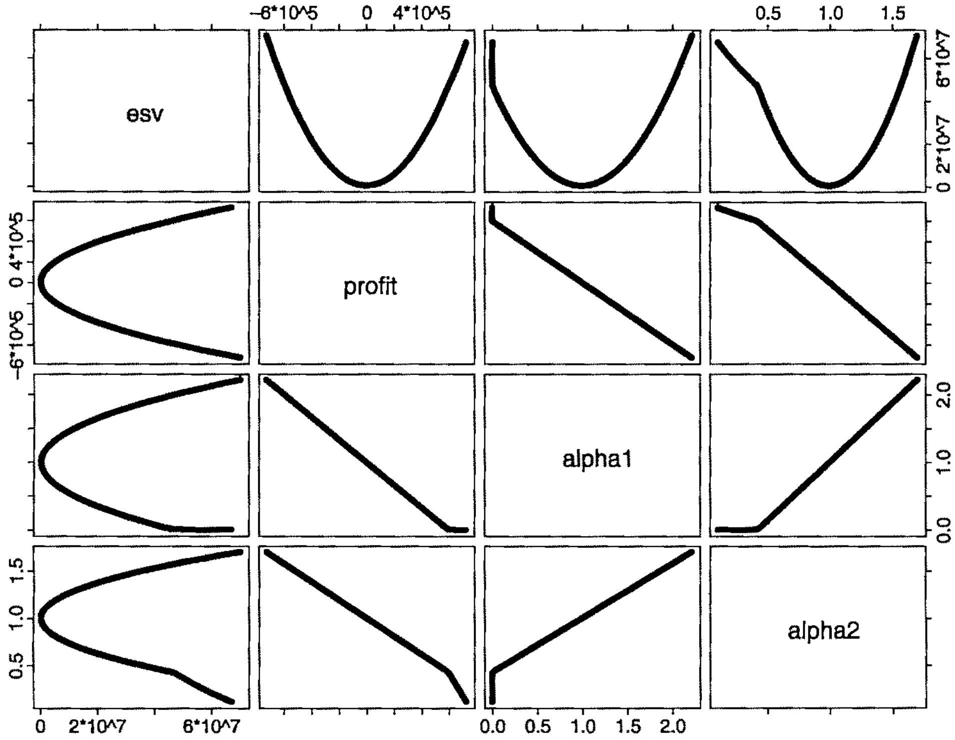
Comparative Effect of Allocation, Matching and No-Matching on ESV

In this subsection, the effect on ESV of applying the optimal cost allocation, matching and no-matching rules to earnings calculations, with and without the non-negativity constraint on α, under different levels of profitability are considered. Different profitability levels are again obtained by changing the distribution parameters for revenue. It is useful for present purposes to allow revenue to become positive to illustrate the difference between the constrained and unconstrained cases. The results are shown in Figure 5.

The graphs in Figure 5 show that constrained and unconstrained optimization gives identical results if the net profit ratio, defined as the ratio of net profit to total expenses, is less than 1. In this case, at the point where the net profit ratio becomes equal to 1, the revenue parameters become positive. This results in the

FIGURE 4

INEQUALITY CONSTRAINED MINIMIZATION OF ESV



optimal α_j coefficient value being less than 0, which means that a substantial difference will exist between constrained and unconstrained optimization outcomes. Additionally, if the constraint value $\alpha_j \geq 0$ is imposed, the optimal and unmatched allocation rules give very similar ESV results once the profit ratio exceeds 1.[8]

The lowest optimal ESV value in this analysis is attained when the net profit ratio equals 0 for both the matched and optimal cases, and when it equals 1 for the unmatched case. This suggests that using the optimal smoothing formula can give a substantial variance reduction effect compared to the matching or not matching, except in the special situations where the net profit ratio is equal to 0 or 1.

Profitability Estimates Compared Using Allocated, Matched and Unmatched Earnings

In this subsection, the allocation, matching and no-matching rules are applied to earnings calculations in a series of simulation experiments. The objective is to

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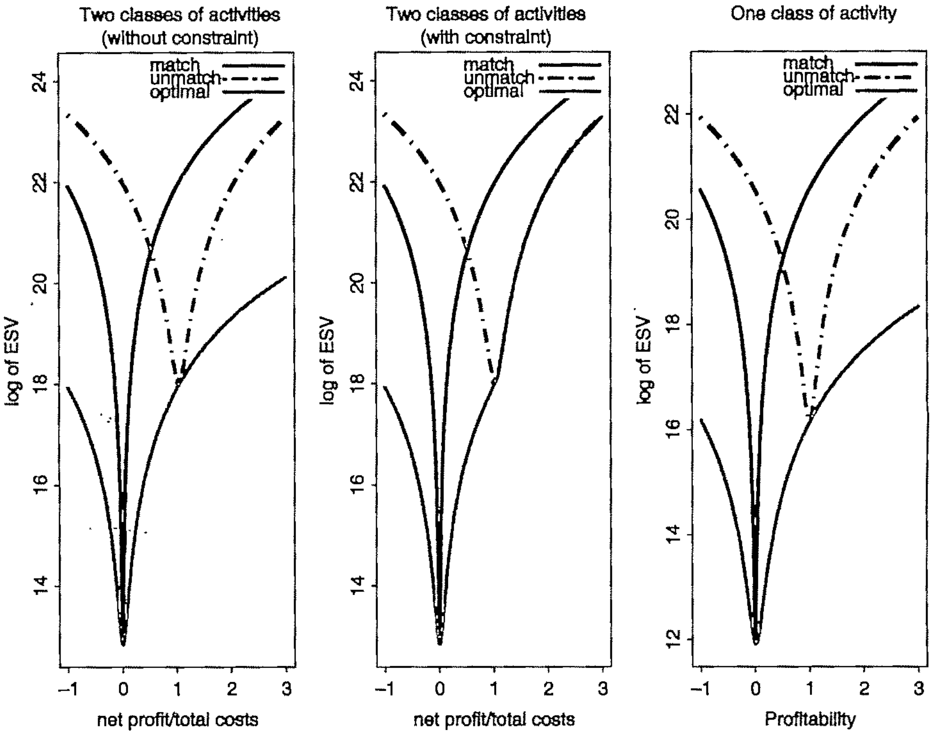
[8] The V shape observed in the graph in Figure 5 is due to the log transformation of the variance reduction measure and the fact that the variance is a quadratic function and is not scale invariant.

Figure 5

LOG OF ESV BETWEEN MATCHED, UNMATCHED AND OPTIMAL SCENARIOS FOR CONSTRAINED AND UNCONSTRAINED OPTIMIZATION



assess their relative performance in procuring reliable long-term profit estimation. Two situations, designated A and B, are presented. The simulation parameters for situation A are given in Table 4 and these are later modified for situation B as shown in Table 5.

To facilitate comparisons of the long-term-profit, estimation performance of the three rules, periodic earnings are calculated with their cumulative mean plotted as illustrated in Figure 6. The cumulative mean is an estimate of the final profit at the end of each period. For example, at the end of period 4, the eventual mean profit figure was estimated to be a loss at $15,104.73 from averaging the results over periods 1 to 4. Irrespective of any allocation rules, the accuracy of the estimate will increase as the final period approaches. This is due to the effect of more information becoming available as time progresses. The figure calculated for period 12, $–39,487.30, is exactly the final profit over the 12 months period. The cumulative mean profit comparison is used to establish how the allocated, matched, unmatched earnings rules effect estimation of the long-term profit per

TABLE 4

SITUATION A: PARAMETERS USED TO COMPARE OPTIMAL RULE, MATCHED, AND UNMATCHED SCENARIOS IN A SIMULATION EXPERIMENT

No. of activities	1000
	1500
Start time parameters	MN(1000, $p_i = 1/12$)
	$i = 1 \ldots 12$
	MN(1500,0.086,0.086,0.108,0.072,0.065, 0.086,0.108,0.086, 0.065,0.072,0.115,0.051)
Finish time parameters	MN(1000,0.0036,0.0112,0.0196,0.0289,0.0393, 0.0513,0.0653, 0.0820,0.1033,0.1318,0.1763,0.2874)
	MN(1500,0.004,0.014,0.022,0.035,0.032, 0.058,0.109,0.073,0.087,0.120,0.187,0.259)
Expense: Product 1	Uniform[300,400]
Revenue: Product 1	Uniform[–800,–600]
Expense: Product 2	Uniform[200,300]
Revenue: Product 2	Uniform[–600,–400]
Optimal rule	$\alpha_1 = 2.215750$
	$\alpha_2 = 1.699748$

FIGURE 6

TRANSFORMING PERIODIC INCOME INTO CUMULATIVE MEAN

Actual Results	
1	21262.64
2	25496.65
3	10442.88
4	3216.77
5	2895.301
6	–7561.78
7	–31998.8
8	–44035.6
9	–41980.7
10	–87445.6
11	–118069
12	–206071

→

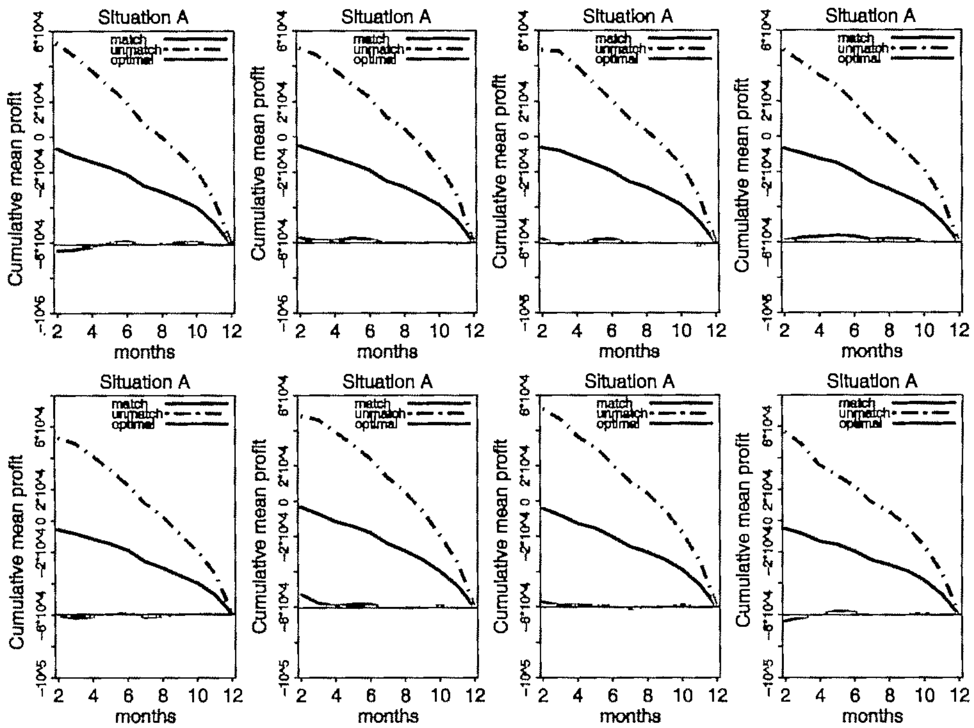
Cumulative mean	
2	23379.64
3	19067.39
4	15104.73
5	12662.85
6	9292.076
7	3393.382
8	–2535.24
9	–6918.06
10	–14970.8
11	–24343.4
12	–39487.3

period of the firm. The results for eight experimental replications under situation A are given in Figure 7.

Figure 7 shows that allocated earnings gives the best estimate of actual average profit of the firm, followed by the matched and then the unmatched versions of earnings. Estimation using the optimal rule gives results almost exactly the same

FIGURE 7

CUMULATIVE MEAN PROFIT GRAPHS FOR SITUATION A



These graphs show how well each of the methods can represent the actual mean profit per period. The graphs show eight particular realizations of simulation results after applying the matched, unmatched, and optimal allocation rule.

as the actual mean profit (shown by the horizontal line) from the second month onwards. Neither the matched nor the unmatched rule approximates the estimation of the optimal rule until period 12.

However, these results belie the fact that the superior performance of allocated earnings in practice will depend on three important factors in relation to the parameters of activity classes (i.e., the parameters of the start time, finish time and cost distributions). These factors are first, the accuracy of the parameter estimations; second, statistical independence of the parameters; and third, the variability of the parameters.

Accuracy of Parameter Estimations The usefulness of allocated earnings is dependent on the parameters of activities being accurately estimated. Establishing the appropriate characteristics of the distributions of start times, finish times and costs is essential. In particular, it is possible to fit a generalized lambda distribution to

TABLE 5

SITUATION B
(Changes from Table 4 are highlighted in bold)

No. of activities	**10**
	15
Start time parameters	MN(1000,$p_i = 1/12$)
	$i = 1 \dots 12$
	MN(1500,0.086,0.086,0.108,0.072,0.065,0.086, 0.108,0.086,0.065,0.072,0.115,0.051)
Finish time parameters	MN(1000,0.0036,0.0112,0.0196,0.0289,0.0393, 0.0513,0.0653,0.0820,0.1033,0.1318,0.1763,0.2874)
	MN(1500,0.004,0.014,0.022,0.035, 0.032,0.058,0.109,0.073,0.087,0.120,0.187,0.259)
Expense: Product 1	**Uniform[300,400000]**
Revenue: Product 1	**Uniform[–800000,–600]**
Expense: Product 2	**Uniform[200,300000]**
Revenue: Product 2	**Uniform[–600000,–400]**
Optimal rule	α_1 = **1.690567**
	α_2 = **1.751078**

real-life data in order to model the distributions of these parameters. There are numerous contributions to the literature in this field (King and MacGillivray, 1999; Freimer *et al.*, 1988; Karian and Dudewicz, 2000; Lakhany and Massuer, 2000; Su, 2007).

Statistical Independence This work assumes that the underlying costs, start times, and finish times of the activities in any activity class are random and statistically independent. In non-competitive situations, such as where monopolistic practices are present, the results reported above might change.

Variability The variability of the parameters can influence the effectiveness of allocations. For example, the parameters listed in Table 4 are replaced by more volatile parameters and a smaller number of activities in Table 5. The results for this situation are shown in Figure 8 and are indicative of what may be obtained as a consequence of greater variability in the parameters.

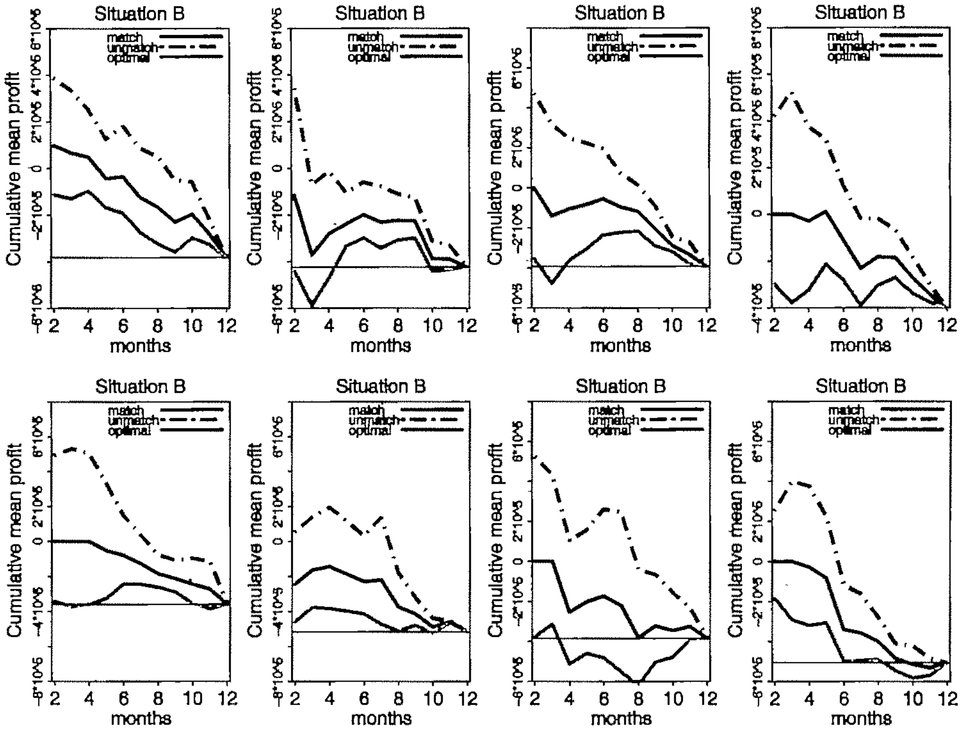
Figure 8 shows that the superior effectiveness of allocated earnings is decreased and is more erratic than in situation A (see Figure 7 above). The variance reduction effect of allocations is still reasonably marked because a profit is made in this case.

CONVERGENCE

An important practical issue is to establish how many activities are required to ensure that the kind of cost allocations described in this article work well. A simple solution is provided here.

FIGURE 8

CUMULATIVE MEAN PROFIT GRAPHS FOR SITUATION B



These graphs show how well each of the methods can represent the actual mean profit per period. The graphs show eight particular realizations of simulation results after applying the matched, unmatched, and optimal allocation rule.

Regardless of the transformations applied to accounting data, accounting numbers are derived by summing across activities in a particular accounting period. Let the final earning figure for period i be G_i, which occurs in period i with probability q_i. Further assume that random costs W are associated with G_i, and that there are k accounting periods and n transactions. Using the results in Su (2005), the approximate ESV value is,

$$\frac{\sum_{i=1}^{k} E(G_i - \bar{G})^2}{k-1} \approx \frac{n\left[\mathrm{Var}(W) + (E(W))^2\left(1 - q + nq - \frac{n}{k}\right)\right]}{k-1}, \tag{5}$$

where $q = \sum_{i-1}^{k} q_i^2$.

Expression $\dfrac{\left[\sum_{i=1}^{k}(G_i - \bar{G})^2\right]}{k-1}$ can be approximated by other means. G_i and $\bar{G}$ can be approximated by $E(W)nq_i$ and $E(W)nk^{-1}$ respectively (see Su, 2005, for details). The result is shown in equation (6).

$$\frac{\left[\sum_{i=1}^{k}(G_i - \bar{G})^2\right]}{k-1} \approx \frac{[E(W)]^2 n^2 \left[q - \frac{1}{k}\right]}{k-1} \tag{6}$$

Equation (5) shows the approximate theoretical expected value, and equation (6) shows a rough approximation. The relative error of approximation is obtained by relating these equations according to the expression ((6) – (5))/(5).

$$\text{Relative error (RE)} = \frac{[-\text{Var}(W) - [E(W)]^2(q-1)]k}{n(qk-1)[E(W)]^2} \tag{7}$$

The limit for RE as $n \to \infty$ is zero. This means the approximation improves as n becomes larger. In the context of two product activities, after finding the optimal coefficients α_1 and α_2, $\dfrac{\sum_{i=1}^{k} E(G_i - \bar{G})^2}{k-1}$ can be found using equation (3) above. An approximation for $\dfrac{\left[\sum_{i=1}^{k}(G_i - \bar{G})^2\right]}{k-1}$ can be found by applying the following expressions:

$$\begin{aligned} G_i &= \sum_{j=1}^{m} n_j[\alpha_j E(X_j) + E(Y_j)]q_{ij} + (1-\alpha_j)E(X_j)n_j p_{ij} \\ \bar{G} &= \frac{\sum_{i=1}^{k} G_i}{k} \end{aligned} \tag{8}$$

With respect to material above, the relative errors for the situations in Table 4 and Table 5 were –0.52 and –17.98 respectively. The results in Figure 7 show that allocated earnings works much better in this situation than for the situation in Figure 8 and this difference is reflected in the relative error calculations. A lower relative error means the optimal rule works more effectively. By applying expression (7), it is possible to define a tolerance level for the relative error in order to find the required n. However, this procedure does no more than calculate the relative error from an approximation. It is, therefore, usually worthwhile running a number of simulations to examine the effectiveness of the optimal rule in the presence of different relative errors and different numbers of activities.

CONCLUSION

This work shows how the statistical variance of earnings can be reduced by the use of overhead cost allocations. It provides some illustrations as to how it might be possible to smooth earnings optimally using simple cost allocation techniques. More complex and specific business scenarios such as correlated individual expenses and revenues could be derived within this framework. Some convergence properties of the allocation method are also demonstrated.

The analysis used, while quite general, has limitations. Two specific limitations are as follows:

1. The analysis uses approximate formulae for the calculation of expected sample variance. It is designed to make the results accessible to an accounting audience. The use of more complex, exact formulae would give similar results. Interested readers can obtain the exact formulae by contacting the author.
2. In some situations, the theoretical variance of a distribution generating an activity cost parameter may not exist and the use of the sample variance as a way of measuring volatility may not always be appropriate. In such circumstances it may be preferable to minimize other quantities such as the inter-quartile range or the squared deviation from the median.

Currently, the general view on the subject of accounting conservatism, as reported by the Financial Accounting Standard Board, Basu (1997) and Hendriksen and Van Breda (1992), is that it tends to impair information quality.[9] However, as argued by Fan and Zhang (2006), this viewpoint does not consider the case where information quality is internal to the firm, when accounting conservatism can improve the quality of accounting information in a number of different situations. While the approach taken here is very different to that of Fan and Zhang, it shows that an optimal strategy for reliable estimation of firm profitability can be to over-allocate expenses in profit making firms. This suggests that the accounting principle of conservatism, in some situations at least, improves information quality by reducing uncertainty about firm profitability.

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AZIZ JAAFAR AND STUART MCLEAY

Country Effects and Sector Effects on the Harmonization of Accounting Policy Choice

This study assesses the extent of accounting harmony in Europe prior to the recent switch to IFRS, by presuming that accounting is harmonized when 'all firms operating in similar circumstances adopt the same accounting treatment for similar transactions regardless of their domicile'. The policies studied concern inventory, depreciation and goodwill, and the odds of using alternative accounting methods are predicted by logistic regression. The empirical results suggest that, while international exposure and firm size are significant factors, country effects are considerably greater than sector effects, which is inconsistent with harmonized accounting.

Key words: Accounting; Country effects; Depreciation; Goodwill; Harmonization; International standards; Inventory; Sector effects.

The measurement of international accounting harmonization allows accounting policy makers to evaluate the success or otherwise of their recommendations, and to identify where their efforts should be concentrated in future (Pierce and Weetman, 2000). This is especially important as the IFRS regime gathers momentum (Ali, 2005).

Early attempts at evaluating the internationalization of accounting exposed the considerable lack of comparability between accounting rules and regulations then in force within different jurisdictions (e.g., Nair and Frank, 1981; McKinnon and Janell, 1984; Doupnik and Taylor, 1985), but with little reference to the harmonization process itself. The methodological problems associated with these early studies were examined in detail by Nobes (1992), Tay and Parker (1990) and van der Tas (1992), and there has been much research in the meantime that has attempted to index financial statement comparability in order to assess the impact of harmonization programs.

In their endeavours to index harmonization, many of the researchers who have taken up this challenge (e.g., van der Tas, 1988, 1992; Emenyonu and Gray, 1992, 1996; Archer *et al.*, 1995; Pierce and Weetman, 2000; Parker and Morris, 2001; Taplin, 2003) have concentrated exclusively on the firm's domicile as the determinant of its financial reporting practices. This is because the conventional research design has focused on between-country variation in the accounting policies adopted by firms, presupposing that accounting practice systematically reflects the

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rules and regulations in force in the country where the firm is registered. However, the selection of a particular accounting method will depend not only on the firm's location and the set of regulations involved, but also on its operating circumstances and other factors. Indeed, we would argue that accounting diversity is the natural result of varying business circumstances, which by necessity may require different accounting treatments, a stylized fact that has been recognized previously in interpreting harmonization, although only to a limited extent (Herrmann and Thomas, 1995; Archer *et al.*, 1996; McLeay *et al.*, 1999).

Elsewhere, in the mainstream of accounting research, there is ample evidence that firms with different characteristics such as industry membership will adopt different accounting practices (e.g., Watts and Zimmermann, 1990; Watts, 1992), and it is also well known that other factors are relevant including managerial preference. Such findings have important implications for the measurement of the impact of harmonization on accounting practices, which should take into consideration at the very least the diversity resulting from real differences in operating circumstances rather than just assume that harmonization implies a move towards uniformity. In this context, Aisbitt (2001) has already pointed out that attempts to associate changes in harmony with a single factor such as legislation are likely to be unsuccessful simply because firms do not prepare their financial statements in a vacuum, with firm-specific factors and the demands of the market playing a significant role in accounting policy choice. In fact, Rahman *et al.* (2002) have already demonstrated empirically that differences in firm characteristics must be accounted for when assessing the impact of harmonization policies, providing evidence by way of a comparison between Australia and New Zealand.

The present work, which focuses on the EU, attempts to reinterpret harmonization policy within the context outlined above by presuming that *accounting will be fully harmonized when all firms operating in similar circumstances adopt the same accounting treatment for similar transactions, regardless of their domicile.* In this way, when a number of different accounting treatments are available, we would expect the frequency distributions of such treatments not to vary significantly between countries with similar economic structures.[1] Accordingly, this article assesses harmony by using a statistical approach that allows us to determine the odds of selecting alternative accounting treatments, from which inferences can be drawn about the observed and expected frequencies in the EU and its individual member states.

HARMONIZATION AND ACCOUNTING POLICY CHOICE

The questionable assumption referred to above, that maximum harmony will be achieved when all firms adopt exactly the same accounting treatment, underlies many prior studies of harmonization (e.g., van der Tas, 1988, 1992; Adhikari and Emenyonu, 1997; Cañibano and Mora, 2000; Pierce and Weetman, 2000). Here, it is argued instead that the interfirm comparability of any financial statement item will depend on the use of the accounting method that is appropriate to the firm's operating circumstances (e.g., FIFO will be adopted if, and only if, physical inventory movements actually follow the First-In First-Out convention), and not on the use of the same method by all firms (e.g., where FIFO would be required of all firms in all circumstances).

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[1] Given that economic structures can differ internationally, there is of course some likelihood that expected distributions of accounting treatments could vary as a result. It may be noted that the idea of applying distributional analysis in measuring accounting harmony was first suggested by Tay and Parker (1990), but not operationalized.

In this context, it should also be recognized that a firm that diversifies its operations is likely to report the use of two or more accounting treatments where these capture appropriately the different nature of its various activities. For instance, it is not surprising to observe in practice that some firms write down their fixed assets using more than one method of depreciation, as the various assets employed by these firms differ in nature and thus require different depreciation schedules. The research design problems created by the uniformity assumption in such cases are evident in prior work on harmonization measurement. For example, Emenyonu and Gray (1992, 1996), Murphy (2000) and Parker and Morris (2001) each group the firms that report the use of more than one accounting method for a given financial statement item into a distinct subset whose accounts are deemed to be comparable only with each other, and not with those firms which use just one of the accounting methods involved. By implication, the working assumption underlying their harmonization metric is now slightly modified such that maximum harmony would be achieved when all firms adopt exactly the same *set of* accounting treatments for a given financial statement item, which is still an untenable assumption as it requires all firms to follow identical diversification strategies. Other researchers (e.g., Herrmann and Thomas, 1995), while recognizing that many firms in their sample adopt more than one method for a particular item, resolve the issue by omitting these cases from the harmonization metric altogether. A different approach is adopted here by structuring a logistic regression specifically to address these shortcomings, so that the use of more than one accounting method by a firm is captured in the frequency analysis.

Although the general thrust of prior research has been to assess whether the efforts of international and regional policy makers to embrace global accounting standards are reflected in convergent accounting practices, it is worth noting that a number of compelling arguments have been advanced placing doubt on whether full convergence in accounting can ever be achieved. For instance, in proposing an international classification of financial reporting, Nobes (1998) postulates that several different financial reporting practices will coexist, and their importance in any given jurisdiction will depend upon such factors as the general nature of the financing system, the types of firm that are incorporated, and the institutional structures in place. In a similar vein, Ali and Hwang (2000) and Ball *et al.* (2000) each argue that systemic features such as the orientations to either financial institutions or markets, or to either public or private standard setting, together with the degree of conformity with tax reporting and the extent of audit and oversight, will lead to different accounting policy prescriptions. In fact, Ball *et al.* (2003) provide evidence that, dependent upon the characteristics of the individual firm, international differences in reporting incentives inherently limit the extent to which the comparability of accounting earnings can be achieved through international standardization alone.[2]

As mentioned, there is already an extensive body of research concerning the firm-level and industry-level determinants of financial reporting practices. This is particularly so with respect to the extent of financial disclosure. For instance, Cooke (1992) finds that manufacturing firms disclose more information than non-manufacturing firms. Meek *et al.* (1995) argue that proprietary costs may differ across industries, which accounts in part for inter-sectorial variability in disclosure. Firm size is another important determinant (Christie, 1990), and the evidence shows that larger firms provide more voluntary disclosures (e.g., Cooke, 1992; Gray *et al.*, 1995; Ashbaugh, 2001). Since larger firms generally have a higher level of analyst following, the costs of information dissemination are reduced, but higher political costs caused by higher public exposure, and higher agency costs caused by more widely dispersed ownership, also result in larger firms voluntarily making more disclosures (Lang and Lundholm, 1993). Foreign listing is also associated with more information disclosure (Cooke, 1989; Malone *et al.*, 1993). Such firms face additional capital market pressures, including stock exchange requirements, which may motivate them to increase their level and quality of disclosure, an outcome that has been particularly evident amongst firms switching to IFRS and U.S. GAAP (Tarca, 2004; Daske and Gebhardt, 2006). Firm-specific attributes are indeed important in determining disclosure behaviour, and, as already noted, the same applies to the accounting policy choices exercised by managers (Hossain *et al.*, 1995). In the international context, Leuz and Verrecchia (2000) demonstrate clearly how size and other factors are predicted to affect the firm's international reporting strategy as a whole. Yet most previous attempts at measuring the extent of accounting harmonization have ignored this aspect. It is therefore a further aim here to examine empirically the extent to which firm-specific characteristics—the sector of operations, the firm's size and its international market exposure—affect its accounting policy choices, and to control for such variability in assessing harmonization.

In summary, this article evaluates the extent of harmonization in the EU during the 1990s, that is to say, following the enactment of the European accounting directives in all pre-enlargement member states and prior to the decision to embrace the IASB's international financial reporting standards. The annual reports of European firms have been analysed for the years 1991, 1995 and 1999 with respect to three accounting policies: inventory costing method, depreciation of fixed assets and goodwill on consolidation. The design of the research study and the results obtained are discussed in greater detail below.

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[2] Limits may also be placed on convergence by regulators if they agree to recognize each others' reporting standards, e.g., for cross-border listing purposes—see Cairns (1994) and Bindon and Gernon (1995) on the concepts of 'mutual recognition' and 'bounded diversity'.

RESEARCH DESIGN

The Data

The initial working list of firms was obtained from the 2000 Reuters Surveys of quoted companies in continental Europe and the U.K. (Reuters, 2000a, 2000b, 2000c). These surveys include information on analyst following by industry for the largest quoted companies in continental Europe (1,050 firms) and the U.K. (350 firms). For all of these firms, this source therefore provides an objective assessment of the predominant sector of operations. The selected sample was then restricted to firms domiciled in the pre-enlargement EU member states.[3] Financial institutions and insurance firms have been excluded, due to the specialized financial statements prevalent in these sectors. The firms involved range from the largest multinationals with global activities to medium capitalizations operating mainly in local markets, and the final sample therefore represents a cross-section of commercial firms in the EU that are influenced in some cases by international factors and in other cases only by country-specific factors.

The number of firms across different countries of domicile and across different sectors of operations is shown in Table 1. As reported in the table, the aggregate number of sampled firms during the financial years ending 1991, 1995 and 1999 is 541, 673 and 698 respectively.

For the purpose of this study, the data set is further classified according to the listing status and size of the firm. As mentioned earlier, these attributes are cited in the literature as important variables in influencing accounting policy choice, and are also known to correlate with other factors considered in prior research. As shown in Table 2, the number of firms listed only in their country of domicile is 471 as compared to 235 which are listed both in their country of domicile and internationally. Firm size is measured by market capitalization at the beginning of 2000, and the classification in Table 2 is based on whether a firm falls above or below the median size.

Accounting policy choices were examined systematically using actual annual reports obtained from three sources. The main source of annual reports was Global Access,[4] and therefore these were obtained in a machine-readable format. This solves the common problem faced in the past when collecting annual reports directly from the firms concerned, where a non-response bias was created by firms that did not mail the requested reports (Cañibano and Mora, 2000). If the annual reports were not available on this database, the second alternative was to review them on microfilm, a service which is provided in the U.K. as part of a project funded by the Research Support Libraries Programme and which can be accessed at www.score.ac.uk. Finally, a small number of annual reports were downloaded directly from the sampled firms' websites.

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[3] No quoted firms domiciled in Luxemburg and Greece qualified for the Reuters Surveys.

[4] Provided by Thomson Financial, Global Access is a financial information research tool that combines international coverage of accounting and other corporate information together with various source documents delivered online.

TABLE 1

EU FIRMS: SAMPLE STRUCTURE

	1991	1995	1999	Full sample
Panel A: Country of domicile				
Austria	11	14	15	15
Belgium	24	24	26	26
Germany	59	71	74	76
Denmark	16	23	23	23
Spain	36	42	43	45
Finland	20	27	33	33
France	76	99	106	107
Ireland	13	15	15	15
Italy	32	38	40	41
Netherlands	41	52	53	54
Portugal	7	9	10	10
Sweden	38	48	47	48
United Kingdom	168	211	213	213
Total	541	673	698	706
Panel B: Sector of operations				
Basic industrials	118	141	145	148
Consumer goods	114	144	145	147
Services	137	174	186	187
General industries	112	139	144	146
Information technology	10	18	20	20
Resources	18	19	19	19
Utilities	32	38	39	39
Total	541	673	698	706

Initially we attempted to use the Worldscope database as the source of the accounting policies adopted. However, when the accounting policy information provided in this database was compared to that disclosed in published annual reports, we discovered numerous inconsistencies that were impossible to reconcile. Further, the Worldscope database does not provide the level of detailed information that is required for our statistical analysis. For example, in the case of a firm adopting more than one treatment for a given accounting item, this database would simply describe it as 'mixed' without specifying the precise combination of accounting methods involved.[5]

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[5] A detailed assessment of other pitfalls surrounding the use of commercial databases in international accounting research can be found in García Lara *et al.* (2006).

TABLE 2

LISTING STATUS AND FIRM SIZE

	Listing		Size[a]	
	Domestic	Interlisted	Below the median	Above the median
Panel A: Country of domicile		Number of firms		
Austria	12	3	13	2
Belgium	15	11	15	11
Germany	54	22	30	46
Denmark	17	6	16	7
Spain	24	21	27	18
Finland	22	11	23	10
France	62	45	44	63
Ireland	11	4	11	4
Italy	23	18	22	19
Netherlands	27	27	32	22
Portugal	6	4	3	7
Sweden	34	14	24	24
United Kingdom	164	49	93	120
Total	471	235	353	353
Panel B: Sector of operations		Number of firms		
Basic industrials	106	42	94	54
Consumer goods	77	70	68	79
Services	136	51	81	106
General industries	107	39	89	57
Information technology	14	6	9	11
Resources	6	13	5	14
Utilities	25	14	7	32
Total	471	235	353	353

[a] Firm size is based on market capitalization in million Euros at the beginning of 2000, and classification is based on the median, that is, firms below the median (€1,591M) are classified as small.

Three areas of accounting policy have been examined: inventory costing, goodwill on consolidation and depreciation of fixed assets. Accounting treatments were determined in each case from the general statement of accounting policies and the relevant notes accompanying the financial statements. A number of difficulties were encountered during the process of analysing the data. First, not all statements of accounting policies were written with sufficient clarity. Thus, annual reports had to be examined thoroughly to find any indication of the firm's policy choice. Some annual reports were available in English in addition to the source language, and some were available in English in a summarized format. As these summarized annual reports often do not have the required information on the accounting practices adopted, it was necessary to analyse the comprehensive report. Where necessary, assistance from experts with a background in accounting was sought in translating the relevant sections.

Statistical Models

Given the nature of the categorical data analysed, conventional regression methods would be inappropriate as both the dependent response variable and explanatory factors are discrete rather than continuous. Following the method of analysis of cross-classified data outlined by Fienberg (1977), the binomial linear logistic regression is employed here to determine the odds of using a given accounting method. For instance, for the inventory costing method, binary outcomes are assigned to each possible method (i.e., FIFO, Average and LIFO) as follows: the value 1 is assigned if the method is used, and the value 0 otherwise. This structure therefore also allows for the use of more than one accounting method (i.e., where a firm adopts both FIFO and LIFO) and the regression results are then stacked over the potential outcomes.

The linear logistic model for the dependence of the logit p_i on the values of k explanatory variables, $x_{1i}, x_{2i}, \ldots, x_{ki}$, is

$$\text{logit}(p_i) = \log\frac{p_i}{(1-p_i)} = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \ldots + \beta_k x_{ki},$$

which can be written as

$$p_i = \frac{\exp(\beta_0 + \beta_1 x_{1i} + \ldots + \beta_k x_{ki})}{1 + \exp(\beta_0 + \beta_1 x_{1i} + \ldots + \beta_k x_{ki})}.$$

The empirical analysis fits a simple hierarchy of nested linear logistic models to describe the odds of adopting a given accounting method as a function of different sets of explanatory variables.[6]

Incorporating Main Effects and Interaction Effects Into the Linear Predictor

In addition to the country of domicile, the present study also considers the sector of operations as a main effect in measuring accounting harmonization across the EU. Two firm-level attributes that might be associated with the choice of accounting method are also added, and allowed to interact with both the country of origin and the sector of operations. The first interacting factor that is included for this purpose is listing status, categorized either as international listing or as domestic listing only. The second is size, which is also reduced to two groupings, in this case where market capitalization is above or below the median. Finally, the three

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[6] The analysis was carried out using the generalized linear modelling system GLIM4 (Francis *et al.*, 1993) in order to obtain full diagnostics for the purposes of this article, and the model fitting was validated with Minitab's GLM function.

TABLE 3

VARIABLE STRUCTURE

Main effects	Levels
Country of domicile (13 levels)	Austria; Belgium; Denmark; Finland; France; Germany; Ireland; Italy; Netherlands; Portugal; Spain; Sweden; United Kingdom
Sector of operations (7 levels)	Basic industries; Consumer goods; Services; General industries; Information technology; Resources; Utilities
Listing status (dummy variable)	0 = Domestic; 1 = Interlisted
Size—Market capitalization (dummy variable)	0 = Below the median; 1 = Above the median
Time period (ordinal)	1 = 1991; 2 = 1995; 3 = 1999

points in time at which financial reporting practices were observed are dealt with as a covariate, which also interacts with the main effects to allow for different evolutionary paths in different countries and sectors. The model specifications are described below.

Model 1: Conditional Independence Here, the odds of adopting accounting policies are entirely independent of other variables. Nevertheless, the model reflects the constraints imposed by the research design. First, the statistical analysis is restricted to firms whose annual reports are actually available for analysis, a major factor being the variation in the populations of firms between countries and sectors, and changes in the population of firms from one time period to another. Second, the model is also conditional on disclosure, with non-disclosure of accounting policy choices being treated as non-stochastic. This model is the basis against which the impact of the country of domicile, the sector of operations and other firm-specific characteristics are assessed, that is:

$$\text{logit}(p_i) = \log\left(\frac{p_i}{1-p_i}\right) = \beta_0.$$

Model 2: Main Effects This second model adds the main effects to the model of conditional independence to assess their impact on the choice of accounting method. There are thirteen separate countries of domicile, as indicated in Table 4, and the sector of operations is classified into seven broad categories following the Reuters Survey. The associated linear model incorporating each main effect is denoted as follows:

$$\text{logit}(p_i) = \beta_0 + \beta_{A,i},$$

where A represents either the country of domicile or the sector of operations.

Model 3: Interaction Effects This model adds the additional effects arising from differences either in listing status, company size or time and allows each of these effects to vary across the member states of the EU or across the various industrial sectors. Model 3 captures the extent to which accounting policy choices are exercised systematically by firms with international market exposure or by firms that are large, or any systematic changes in adoption rates throughout the research period. Each of the additional explanatory factors is allowed to interact with the main effects, and therefore the choice of accounting method is described as a function of the country of domicile or sector of operations (A) together with the additional effect of either listing, size or time (B) and the second-order interactions which allow the additional effect to vary depending on the firm's domicile ($A.B$). The associated linear model is therefore denoted as:

$$\mathrm{logit}(p_i) = \beta_0 + \beta_{A,i} + \beta_{B,i} + \beta_{A.B,i}.$$

With regard to listing status, as noted earlier, firms have been classified as either domestically listed or internationally listed, and firm size, which is based on market capitalization, is simplified by categorizing firms either as small (below the median size) or large (above the median). Therefore, *Listing* and *Size* are effectively dummy variables that take up one extra degree of freedom for each country or sector interaction.

This same model may also be used to allow for the changes in accounting policy choices that took place over the 1990s across different EU countries and different sectors of the economy. The decade as a whole was witness to two major harmonization initiatives in Europe, as it started before the full impact across all EU member states of the European company law harmonization directives in the early 1990s and continued through to the initiation of the current international standardization program in the late 1990s. For our purposes, as three specific years were selected (1991, 1995 and 1999), *Time* is treated as a covariate that allows for a smoothed evolutionary path in each country or sector through the period as a whole, again taking up one extra degree of freedom for each country or sector interaction.[7]

Measuring Goodness of Fit

The reasonableness, or likelihood, of a model given the observed data is referred to in the case of a generalized linear model as its 'deviance'. The change in deviance is therefore a likelihood ratio which measures the relevance of the additional variables for the improvement of the fit of the model. The relative goodness of fit of two nested models can be calculated by examining the ratio of (a) the change in deviance between the two models within a hierarchy scaled by the change in the degrees of freedom, to (b) the deviance for the full model scaled by the remaining degrees of freedom.

Where the deviance of a higher order model, M_H, is D_H on ν_H degrees of freedom and the deviance of the lower order model, M_L, containing a subset of the terms in the higher order model, is D_L on ν_L degrees of freedom, and D_F is the deviance of the full model on ν_F degrees of freedom, the ratio $\frac{[(D_L - D_H)/(\nu_L - \nu_H)]}{(D_F/\nu_F)}$ has an F-distribution on $(\nu_L - \nu_H)$, (ν_F).

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[7] As *Time* is treated as an ordered covariate ($B = 1,2,3$), whereas *Listing* and *Size* are treated as factors with two levels ($B = 0,1$, similar to OLS dummy variables), the associated linear structure in the case of *Time* is more precisely denoted as $\mathrm{logit}(p_i) = \beta_0 + \beta_{A,i} + \beta_{B,i}B + \beta_{A.B,i}B$.

A small F-statistic indicates that model M_H and model M_L may not be distinguished, as the residual deviance for the reduced model M_L is not much larger than for model M_H. As a rule of thumb, a ratio greater than one indicates that the average contribution to explanation by the parameters added to the lower order model exceeds the average residual error in the full model when scaled over the remaining degrees of freedom. More formally, the F-statistic provides a likelihood ratio test of the hypothesis that the variables added to the model do not contribute to the regression function with respect to successive higher order models. Finally, as the effect of each additional variable in the model cannot be estimated independently of the others, the order in which the terms are included is important when interpreting the model.[8]

EMPIRICAL RESULTS

This section describes how we analysed accounting practices in 1991, 1995 and 1999. As indicated, the accounting policies considered here concern inventory costing, goodwill on consolidation and depreciation of fixed assets. The main criteria for selecting these specific accounting issues are threefold. First, all three areas of accounting policy have been considered controversial in terms of comparability, having large and systematic effects on the assets and expenses reported in financial statements (Pincus, 1994; Christie and Zimmermann, 1994). Second, for these particular accounting policies, a number of different alternative treatments have long existed. Third, in each case there is considerable evidence concerning firm-specific reporting behaviour. These are discussed in greater detail below.

Inventory Costing Method

Across the EU, accounting regulations covering inventory costing methods have been diverse. The EU Fourth Directive (Article 40) is flexible in that it permitted the First-In First-Out (FIFO), the average cost, the Last-In First-Out (LIFO) and similar methods. Although the IASB Improvement Project (IASB, 2002) eliminated the LIFO option as from 2003, this method was in fact already banned in some jurisdictions including Denmark, Ireland and Sweden. In other countries, the use of LIFO was allowed for tax purposes only if the method was also used for financial reporting purposes (Ordelheide, 2001).

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[8] In addition to fitting each set of interactions separately, the order was reversed by fitting all three additional factors (*Listing*, *Size* and *Time*) together, and then by adding all of their *Country* or *Sector* main and interaction effects. The outcomes in this respect can be found in footnote 9. It should be noted that, given the limitations of extensive cross-classification (even with sizeable data sets), further interactions such as those between *Country* and *Sector*, and between *Listing*, *Size* and *Time*, were not considered as tests confirmed that some coefficient estimates would be aliased and that others would tend to converge. For example, modelling the *Country.Sector* interactions would require (13 × 7) – 1 = 90 additional parameters. Thus, the main approach that we have taken is limited to an assessment as to whether each of the main effects is conditioned by the three additional factors, rather than to calibrate more complex models that could only be fitted with a far more extensive data set, and which are not required to substantiate the principal conclusions reached in this study.

In addition to accounting regulations, a number of other determinants influence inventory policy choice, including anticipated tax savings and potential stock market reactions (Hagerman and Zmijewski, 1979; Abdel-khalik, 1985; Hunt, 1985; Lee and Hsieh, 1985; Dopuch and Pincus, 1988; Lindahl *et al.*, 1988; Cushing and LeClere, 1992; Guenther and Hussein, 1995). The most popular explanation of inventory accounting policy is that firms choose the method that results in the lowest expected present value of future tax payments (e.g., Biddle and Lindahl, 1982; Lindahl, 1989; Cushing and LeClere, 1992; Guenther and Hussein, 1995). In contrast, empirical studies on the market reaction to inventory policy have shown mixed results. For instance, when LIFO was permitted in the U.S., a positive reaction surrounding its adoption was demonstrated by Ball (1972) and Sunder (1973), while later studies reported a negative market reaction (e.g., Ricks, 1982; Biddle and Ricks, 1988). With regard to other firm-specific characteristics, industry membership, industry concentration, capital intensity, size and internationality have each been related to the choice of inventory method (e.g. Eggleton *et al.*, 1976; Hagerman and Zmijewski, 1979; Kuo, 1993; Craycraft *et al.*, 1998). For instance, Kuo (1993) has shown that the likelihood of LIFO adoption increases with the size of the firm and inversely to leverage, suggesting that smaller firms are more likely to choose an income-increasing accounting method when debt increases, probably due to the covenants in their debt contracts. However, other factors will also intervene, as there is other evidence that firms with higher relative levels of international exposure, which tend to be larger, are less likely to use the LIFO inventory method than firms that are not involved in international markets (Craycraft *et al.*, 1998).

The inventory methods adopted by firms domiciled in the pre-enlargement EU member states are set out at the top of Table 4, in Panel A, where it is shown that during the period as a whole firms mainly selected either FIFO (554 firm-years) or the average cost method (532 firm-years), with a smaller number of LIFO adoptions (131 firm-years). Whilst there were fewer firms using the LIFO method by the end of the period (i.e., either on its own or together with one of the other methods), the increase in the proportion of firms adopting FIFO or the average cost method was mainly explained by the drop in the proportion of nondisclosers.

It can be seen from the table that about 10 per cent of the sampled firms applied different cost formulae to different components of their inventories. This practice is in line with SIC 1 issued by the Standing Interpretation Committee, which requires the inventory in different operating divisions to be valued using 'appropriate' cost principles. The following extract from a German annual report illustrates this point in practice:

> In the steel segment, the cost of similar inventories is determined predominantly using the LIFO method. In other segments, the valuation of similar inventories is dominated by the average cost method. (Thyssen, Annual Report 1999, p. 77)

TABLE 4

ACCOUNTING POLICY METHODS TABULATED BY COUNTRY OF DOMICILE

Panel A: Inventory costing

	Average cost (AC)	FIFO	LIFO	AC + FIFO	AC + LIFO	FIFO + LIFO	AC + FIFO + LIFO	Other	Not disclosed	Total
Austria	19	1	0	1	1	0	2	0	16	40
Belgium	23	17	0	0	5	3	1	0	25	74
Germany	58	3	16	8	31	3	4	3	78	204
Denmark	11	34	0	2	0	0	0	0	15	62
Spain	77	7	0	7	3	0	0	0	27	121
Finland	5	49	0	3	0	3	0	0	20	80
France	80	54	4	39	3	1	5	2	93	281
Ireland	3	15	0	0	0	0	1	0	24	43
Italy	39	13	15	11	14	7	1	0	10	110
Netherlands	19	32	0	5	0	3	0	1	86	146
Portugal	17	6	0	0	0	0	0	0	3	26
Sweden	0	88	0	1	0	0	0	0	44	133
UK	16	102	0	17	0	5	0	0	452	592
Total	*367*	*421*	*35*	*94*	*57*	*25*	*14*	*6*	*893*	*1912*
1991	98	112	17	21	15	10	3	0	265	541
	18.1%	20.7%	3.1%	3.9%	2.8%	1.8%	0.6%	0.0%	49.0%	100.0%
1995	121	140	12	31	19	7	5	3	335	673
	18.0%	20.8%	1.8%	4.6%	2.8%	1.0%	0.7%	0.4%	49.8%	100.0%
1999	148	169	6	42	23	8	6	3	293	698
	21.2%	24.2%	0.9%	6.0%	3.3%	1.1%	0.9%	0.4%	42.0%	100.0%

Panel B: Goodwill on consolidation

	Immediate write-off (IWO)	Amortized (A)	Permanently capitalized (PC)	IWO + A	A + PC	Not disclosed	Total
Austria	10	18	0	3	0	9	40
Belgium	0	60	0	2	0	12	74
Germany	85	91	0	3	0	25	204
Denmark	25	22	0	3	0	12	62
Spain	2	87	0	0	0	32	121
Finland	3	72	0	0	0	5	80
France	1	235	2	3	0	40	281
Ireland	17	22	0	3	1	0	43
Italy	19	64	0	6	0	21	110
Netherlands	101	30	0	1	0	14	146

TABLE 4

(CONTINUED)

Panel B: Goodwill on consolidation

	Immediate write-off (IWO)	Amortized (A)	Permanently capitalized (PC)	IWO + A	A + PC	Not disclosed	Total
Portugal	0	12	0	1	0	13	26
Sweden	0	114	0	1	0	18	133
UK	307	172	7	33	10	63	592
Total	*570*	*999*	*9*	*59*	*11*	*264*	*1,912*
1991	252	176	0	10	0	103	541
	46.6%	32.5%	0.0%	1.8%	0.0%	19.0%	100.0%
1995	261	282	1	41	0	88	673
	38.8%	41.9%	0.1%	6.1%	0.0%	13.1%	100.0%
1999	57	541	8	8	11	73	698
	8.2%	77.5%	1.1%	1.1%	1.6%	10.5%	100.0%

Panel C: Depreciation of fixed assets

	Straight line (SL)	Declining balance (DB)	SL + DB	SL + Unit-of-production	Not disclosed	Total
Austria	36	0	1	1	2	40
Belgium	56	2	7	0	9	74
Germany	41	5	156	0	2	204
Denmark	61	0	0	0	1	62
Spain	114	0	4	0	3	121
Finland	77	0	2	1	0	80
France	184	5	78	0	14	281
Ireland	38	0	0	3	2	43
Italy	102	0	0	3	5	110
Netherlands	132	0	5	3	6	146
Portugal	25	0	1	0	0	26
Sweden	130	0	3	0	0	133
UK	548	6	16	17	5	592
Total	*1,544*	*18*	*273*	*28*	*49*	*1,912*
1991	438	4	78	10	11	541
	81.0%	0.7%	14.4%	1.8%	2.0%	100.0%
1995	534	9	101	8	21	673
	79.3%	1.3%	15.0%	1.2%	3.1%	100.0%
1999	572	5	94	10	17	698
	81.9%	0.7%	13.5%	1.4%	2.4%	100.0%

The number of firms not disclosing their inventory policy was consistently high throughout the 1990s. Tonkin (1989) argues that the low level of policy disclosure, coupled with the inherent variability in measurement practices, represents yet another information inefficiency within the international capital market. The low level of disclosure is perhaps due to the possibility that the firm might be following a 'default method' in the country in which it operates, such as compliance with the prescribed local regulation (Archer *et al.*, 1996). On the other hand, non-disclosure of the inventory method may simply reflect the fact that the local accounting regulations do not require the firm to do otherwise unless there is a change in accounting policy. For the purpose of measuring harmonization, we have treated such censoring (i.e., non-disclosure) as non-stochastic, that is, it is not considered as one of the policy choices.

In Table 5, Panel A reports on the extent to which the firm's country of domicile is associated with its inventory policy choice. By adding this explanatory variable as a main effect, the reduction in error indicates the contribution of domicile to the selection of an inventory method. It can be seen from the table that the country main effect is highly significant ($p < 0.001$) in determining the extent to which each inventory method is used, and is at its greatest in the case of FIFO ($F = 72.56$), followed by average method ($F = 63.35$) and LIFO ($F = 54.08$). The first graph in Figure 1 provides an illustration of the linear prediction of the underlying probabilities of adopting each of the alternative inventory methods in the various EU member states covered by this study. On the whole, disharmony is the main characteristic of these results, with different patterns of adoption across the member states involved, the average cost method dominating in countries such as Austria and Spain and FIFO in others such as Sweden and Finland. It should be noted that, as the model permits firms to use more than one method, the sum of fitted probabilities can be interpreted as the odds of selecting more than one inventory method, which is at its minimum (i.e., equal to 1) in Portugal where each firm uses only one method, and at its highest for firms domiciled in Germany where the odds that a German firm may use multiple methods is 1.37 to 1.

In order to allow for any systematic inventory policy choices by firms with international market exposure or by larger firms, and for any harmonization within the research period, and to allow each of these effects to vary across the member states of the EU, *Country.Listing*, *Country.Size* and *Country.Time* interactions were each added to the main effects model. Table 5 shows that the p-values of the *Country.Listing* and *Country.Size* interactions are significant in all cases, which confirms that these firm-specific attributes are also important variables in determining inventory policy choice. However, the *Country.Time* interactions show that, although there were some significant within-country changes in the proportions of firms using the average cost and FIFO methods, there was little significant change across the EU member states in the proportions of firms adopting LIFO. Altogether, while international exposure, company size and changes in time are seen to be important factors in understanding the selection of inventory methods, Panel A of Table 5 shows clearly that, by comparison, country main effects are the dominant influence.

Table 5

STATISTICAL ANALYSIS: INVENTORY METHODS

Panel A: Country effects									
Models and effects	Average cost			FIFO			LIFO		
	Deviance	DF	*F*-ratio	Deviance	DF	*F*-ratio	Deviance	DF	*F*-ratio
1. Conditional independence	1,410.7	1,909		1,404.9	1,909		781.9	1,909	
Main effects									
2. Country	1,007.1	1,897	63.35	962.9	1,897	72.56	582.6	1,897	54.08
Change in deviance	403.6	12	($p < 0.001$)	442.0	12	($p < 0.001$)	199.3	12	($p < 0.001$)
Interaction effects									
3. Country.Listing	977.3	1,884	4.42	935.2	1,884	4.29	551.1	1,884	8.28
Change in deviance	29.8	13	($p < 0.001$)	27.7	13	($p < 0.001$)	31.5	13	($p < 0.001$)
4. Country.Size	974.8	1,884	4.80	935.4	1,884	4.26	568.4	1,884	3.62
Change in deviance	32.3	13	($p < 0.001$)	27.5	13	($p < 0.001$)	14.2	13	($p < 0.001$)
5. Country.Time	983.9	1,884	3.42	947.6	1,884	2.34	575.0	1,884	1.92
Change in deviance	23.2	13	($p < 0.001$)	15.3	13	($p = 0.005$)	7.6	13	($p = 0.754$)

TABLE 5

(CONTINUED)

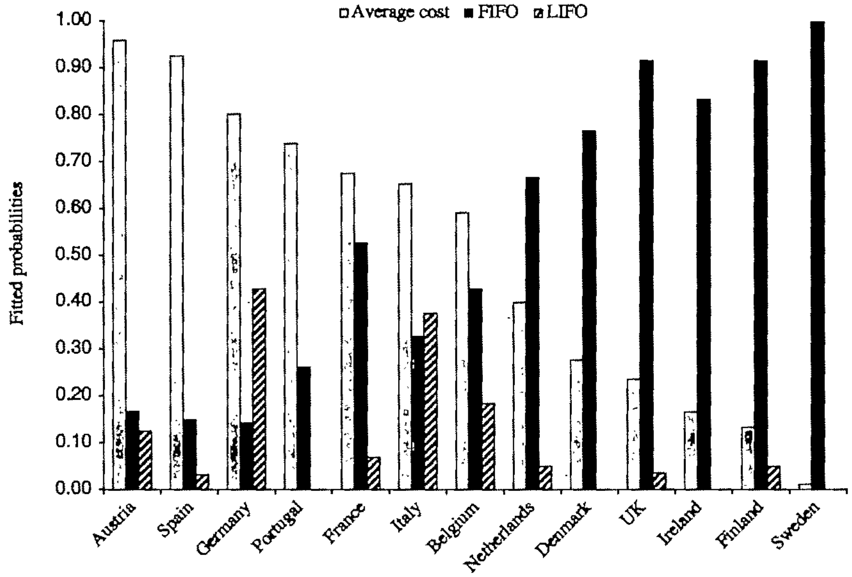
Panel B: Sector effects

Models and effects	Average cost			FIFO			LIFO		
	Deviance	DF	*F*-ratio	Deviance	DF	*F*-ratio	Deviance	DF	*F*-ratio
1. Conditional independence	1,410.7	1,909		1,404.9	1,909		781.9	1,909	
Main effects									
2. Sector of operations	1,381.3	1,903	6.75	1,365.9	1,903	9.06	718.9	1,903	27.77
Change in deviance	29.4	6	($p < 0.001$)	39.0	6	($p < 0.001$)	62.9	6	($p < 0.001$)
Interaction effects									
3. Sector.Listing	1,365.1	1,896	3.21	1,347.6	1,896	3.68	707.7	1,896	4.30
Change in deviance	16.2	7	($p = 0.002$)	18.3	7	($p < 0.001$)	11.2	7	($p < 0.001$)
4. Sector.Size	1,357.2	1,896	–0.02	1,343.3	1,896	4.56	704.1	1,896	39.80
Change in deviance	24.1	7	($p < 0.001$)	22.6	7	($p < 0.001$)	14.8	7	($p < 0.001$)
5. Sector.Time	1,377.3	1,896	0.00	1,361.1	1,896	0.96	713.6	1,896	14.03
Change in deviance	4.0	7	($p = 0.584$)	4.8	7	($p = 0.452$)	5.3	7	($p = 0.051$)

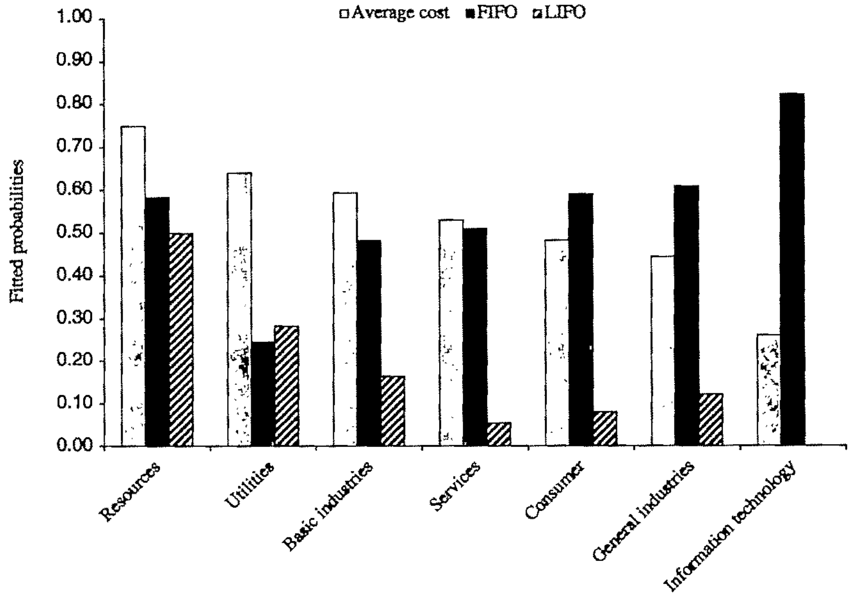
FIGURE 1

INVENTORY METHODS

Panel A: Country effects



Panel B: Sector effects



Panel B of Table 5 presents the impact of the sector of operations on the selection of inventory accounting methods, regardless of the firm's country of registration. The sector main effects are also significant ($p < 0.001$) with respect to each of the inventory policy choices, the F-ratio being at its highest in the case of LIFO ($F = 27.77$), followed by FIFO ($F = 9.06$) and then the average cost method ($F = 6.75$). The fitted probabilities of selecting each inventory method across different sectors are illustrated in Panel B of Figure 1. This contrasts with the more obvious variation that can be seen across the member states of the EU in Panel A, although there are still some differences in adoption patterns across the sectors. For example, the information technology sector is predominantly FIFO-based with no use of LIFO. The results also indicate that a firm belonging to a resources-based industry has the highest odds of employing more than one inventory method, with LIFO being at its most prevalent in this sector. These findings are consistent with the fact that the LIFO method has provided a reasonable description of inventory movements in oil and gas, and FIFO in the case of information technology. But the overriding impression at this level of sector classification is one of weak alignment with alternative inventory costing methods by comparison with the influence of corporate domicile.

The reduction in deviance for both *Sector.Listing* and *Sector.Size* interactions shows again that these attributes are also significant explanatory variables with regard to inventory selection. As with the country effects, the *Sector.Time* interactions reveal little systematic change through the 1990s in the pattern of adopting inventory policies, in this case across the different sectors.

Overall, by comparison with the analysis by member state, there is a substantially lower contribution to explanation when systematic inventory policy choices are modelled by sector of operations, as the following scaled error reductions indicate in the case of the main effects models:[9]

	Average cost	FIFO	LIFO	Scaled mean effect
By country	–31.0	–34.0	–15.3	–26.8
	(28.6%)	(31.5%)	(25.5%)	(29.0%)
By sector	–4.2	–5.6	–9.0	–6.3
	(2.1%)	(2.8%)	(8.0%)	(3.6%)

(The figures in brackets indicate the proportion of the scaled error from Model 1 that is explained.)

Systematic country effects account for 29 per cent of the combined conditional deviance, compared with only 3.6 per cent for sector effects. Even when these main effects are scaled in order to allow for the greater number of cross-classifications by country than by sector, the proportion of deviance explained by a firm's country of domicile is more than four times greater (4.29) than is explained by its sector of operations.[10]

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[9] The total error reduction reported in Table 5 has been scaled by the number of countries or sectors, and averaged across the number of stacked fits (i.e., the number of accounting methods). For example, the scaled mean effect across countries is $(403.6 + 442.0 + 199.3) / (3 \times 13) = 26.8$.

Goodwill Arising on Consolidation

Goodwill is recognized for financial reporting purposes only when it is purchased as part of a business combination. According to IAS 22, goodwill arising on acquisition was to be treated as an asset and amortized over its useful life, with the rebuttable presumption that the useful life of goodwill would not exceed twenty years. The situation in the U.K. has differed from the rest of the EU (Ordelheide, 2001). In FRS 10, the ASB outlawed the previously preferred treatment of eliminating the full amount of goodwill against reserves at the time of acquisition, and required U.K. firms to amortize goodwill systematically over its useful life. Furthermore, permanent capitalization has been another generally accepted method in the U.K., as the *Companies Act 1985* allowed firms to depart from requirements to the extent necessary to provide a true and fair view. With this method, the amount of purchased goodwill is treated as an asset in the balance sheet, and the firm has to conduct an annual impairment test to examine if there is any diminution in its value. This practice is consistent with the current requirement of IFRS 3.

The preferences of managers with respect to goodwill methods has been investigated by Gore *et al.* (2000) to determine which factors may influence a choice in the U.K. between the immediate write-off of goodwill to reserves or capitalization and amortization. Their results provide support for contracting cost theory, particularly for those factors associated with debt covenants, and also management compensation schemes. Moreover, it is known that the length of the goodwill amortization period tends to be related not only to leverage but also to the size of the firm (Hall, 1993). Thus, in addition to the accounting regulations in force, it is evident that goodwill accounting choices are, like inventory costing, associated with determinants other than corporate domicile.

A summary of goodwill methods adopted in the various EU member states is given in Panel B of Table 5. There are three different treatments of purchased goodwill: an immediate write-off to reserves, systematic amortization to the Profit and Loss account, and permanent capitalization. Throughout the sampled period, the amortization method was favoured by firms domiciled in most countries including Belgium, Spain, Finland, France and Sweden. Before the introduction of FRS 10, firms domiciled in the U.K. and Ireland preferred the use of the immediate write-off method, as accounting standards in these member states permitted such treatment. The impact of FRS 10 is reflected in the table in that many firms domiciled in the U.K. and Ireland moved to the amortization method in 1999, although some also switched to permanent capitalization. In the analysis, we also account for different periods of amortization that are employed by firms in the various EU member states, using the following classification: immediate write-off, amortized over ten years or less, amortized over eleven to twenty years, amortized over more than twenty years, and permanent capitalization.[11]

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[10] The multiple 4.29 is given by the ratio of the scaled deviance reductions, that is, scaled country main effects (26.8) divided by scaled sector main effects (6.3). By way of confirmation, we have also fitted the *Listing*, *Size* and *Time* effects jointly before adding *Country* or *Sector* interactions. The *F*-tests give consistent results, which are not tabulated here. The multiple of all *Country* main and interaction effects to all *Sector* main and interaction effects is 3.09 for inventory costing after scaling. Supplementary tests also show that the ratio of all *Country* effects to all *Sector* effects is 4.60 for goodwill, and 1.88 in the case of depreciation.

Panel A of Table 6 shows that the p-values for all goodwill cases are highly significant ($p < 0.001$), indicating that a firm's country of registration is a particularly important determinant of goodwill policy choice. The fitted probabilities of selecting each goodwill method are illustrated in Panel A of Figure 2, and it is again evident that there is considerable disharmony across the EU.

By fitting *Country.Listing* and *Country.Size* interactions, the model improvement is generally significant, except in the case of amortization between eleven and twenty years. However, it is the *Country.Time* interaction that is most revealing. Table 4 shows substantial changes in fitted probabilities during the 1990s, mainly attributable to the switch from immediate write-off to amortization, together with an increase in goodwill policy disclosure.

The results reported in Panel B of Table 6 show that the sector of operations is generally a statistically significant determinant of goodwill policy choices, although, as Figure 2 illustrates for the pooled sample, there is greater similarity in goodwill accounting across sectors than across countries. Nevertheless, some variation between sectors is evident, for example, none of the firms in the information technology sector adopted the longest amortization period (i.e., > 20 years) while firms operating in the resources sector had the highest probability of selecting this method. The *Sector.Listing* and *Sector.Size* interactions provide confirmatory evidence that firm-specific characteristics are indeed significant in determining the goodwill policy choice. In addition, the change in deviance indicates that there have also been significant changes through time, as was predictable given the impact of FRS 10 on the large number of firms listed in the U.K.

In conclusion, by comparison with country main effects, there is again a substantially lower contribution to explanation by sector main effects, as the following summary of deviance reductions indicates:

	Immediate write-off	Amortized (≤10)	Amortized (11–20)	Amortized (>20)	Permanent capitalization	Scaled mean effect
By country	−57.0	−44.0	−10.5	−23.4	−2.7	−27.5
	(32.8%)	(32.3%)	(5.9%)	(29.3%)	(15.8%)	(23.5%)
By sector	−3.9	−5.7	−0.7	−3.5	−2.2	−3.2
	(1.2%)	(2.2%)	(0.2%)	(2.4%)	(7.0%)	(1.5%)

(The figures in brackets indicate the proportion of the scaled error from Model 1 that is explained.)

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[11] During the period as a whole, the observed choices were as follows: amortized over 10 years or less (394 firm-years); amortized between 11 and 20 years (682); amortized over more than 20 years (153).

TABLE 6

STATISTICAL ANALYSIS: GOODWILL METHODS

Panel A: Country effects

Model and effects	Immediate write-off			Amortized (10 years or less)			Amortized (11–20 years)			Amortized (more than 20 years)			Permanently capitalized		
	Deviance	DF	*F*-ratio	Deviance	DF	*F*-ratio	Deviance	DF	*F*-ratio	Deviance	DF	*F*-ratio	Deviance	DF	*F*-ratio
1. Conditional independence	2,258.0	1,910		1,772.4	1,910		2,318.2	1,910		1,041.0	1,910		217.9	1,910	
Main effects															
2. Country of domicile	1,517.0	1,898	77.26	1,200.6	1,898	75.33	2,181.5	1,898	9.91	736.2	1,898	65.47	183.5	1,898	29.72
Change in deviance	741.0	12	($p < 0.001$)	571.8	12	($p < 0.001$)	136.7	12	($p < 0.001$)	304.8	12	($p < 0.001$)	34.5	12	($p < 0.001$)
Interaction effects															
3. Country.Listing	1,498.9	1,885	1.75	1,171.8	1,885	3.56	2,151.9	1,885	1.99	713.4	1,885	4.64	179.3	1,885	3.39
Change in deviance	18.1	13	($p = 0.046$)	28.8	13	($p < 0.001$)	29.6	13	($p = 0.018$)	22.8	13	($p < 0.001$)	4.2	13	($p < 0.001$)
4. Country.Size	1,487.3	1,885	2.89	1,169.0	1,885	3.91	2,158.3	1,885	1.56	681.8	1,885	11.59	178.9	1,885	3.70
Change in deviance	29.7	13	($p < 0.001$)	31.6	13	($p < 0.001$)	23.2	13	($p = 0.090$)	54.5	13	($p < 0.001$)	4.6	13	($p < 0.001$)
5. Country.Time	811.9	1,885	125.92	1,146.0	1,885	6.90	1,597.6	1,885	52.99	711.5	1,885	5.05	145.2	1,885	38.21
Change in deviance	705.1	13	($p < 0.001$)	54.5	13	($p < 0.001$)	583.9	13	($p < 0.001$)	24.8	13	($p < 0.001$)	38.3	13	($p < 0.001$)

TABLE 6

(CONTINUED)

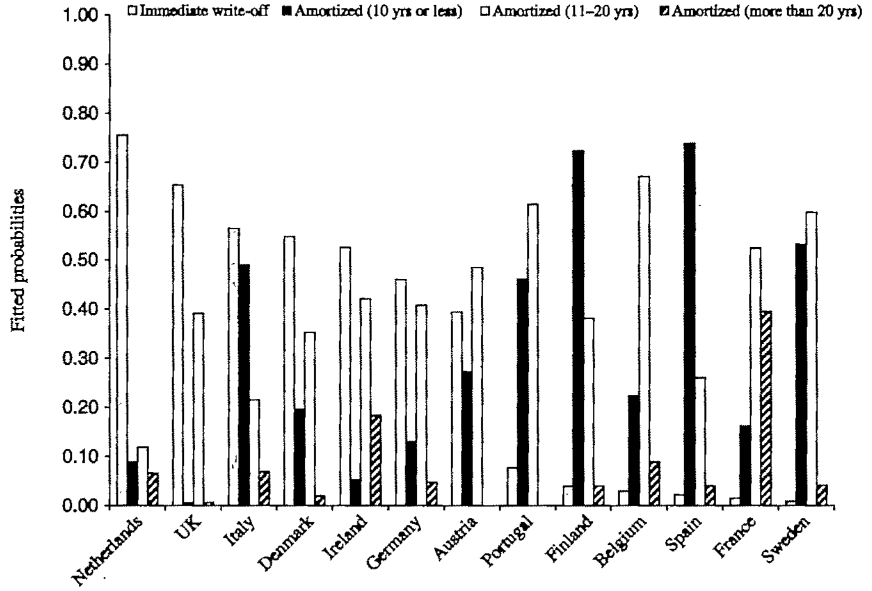
Panel B: Sector effects

Model and effects	Immediate write-off			Amortized (10 years or less)			Amortized (11–20 years)			Amortized (more than 20 years)			Permanently capitalized		
	Deviance	DF	*F*-ratio	Deviance	DF	*F*-ratio	Deviance	DF	*F*-ratio	Deviance	DF	*F*-ratio	Deviance	DF	*F*-ratio
1. Conditional independence	2,258.0	1,910		1,772.4	1,910		2,318.2	1,910		1,041.0	1,910		217.9	1,910	
Main Effects															
2. Sector of operations	2,230.5	1,904	3.91	1,732.6	1,904	7.29	2,313.6	1,904	0.63	1,016.4	1,904	7.67	202.7	1,904	23.88
Change in deviance	27.5	6	($p < 0.001$)	39.8	6	($p < 0.001$)	4.6	6	($p = 0.707$)	24.6	6	($p < 0.001$)	15.3	6	($p < 0.001$)
Interaction effects															
3. Sector.Listing	2,197.1	1,897	4.12	1,710.3	1,897	3.53	2,310.7	1,897	0.34	976.3	1,897	11.15	199.6	1,897	4.15
Change in deviance	33.4	7	($p < 0.001$)	22.3	7	($p < 0.001$)	2.9	7	($p = 0.936$)	40.2	7	($p < 0.001$)	3.1	7	($p < 0.001$)
4. Sector.Size	2,221.8	1,897	1.06	1,712.5	1,897	3.17	2,298.5	1,897	1.78	973.3	1,897	12.00	197.9	1,897	6.53
Change in deviance	8.7	7	($p = 0.389$)	20.0	7	($p = 0.002$)	15.1	7	($p = 0.088$)	43.1	7	($p < 0.001$)	4.8	7	($p < 0.001$)
5. Sector.Time	1,924.8	1,897	43.04	1,719.7	1,897	2.02	1,937.7	1,897	52.58	1,012.9	1,897	0.94	170.1	1,897	52.00
Change in deviance	305.7	7	($p < 0.001$)	12.8	7	($p = 0.049$)	376.0	7	($p < 0.001$)	3.5	7	($p = 0.476$)	32.6	7	($p < 0.001$)

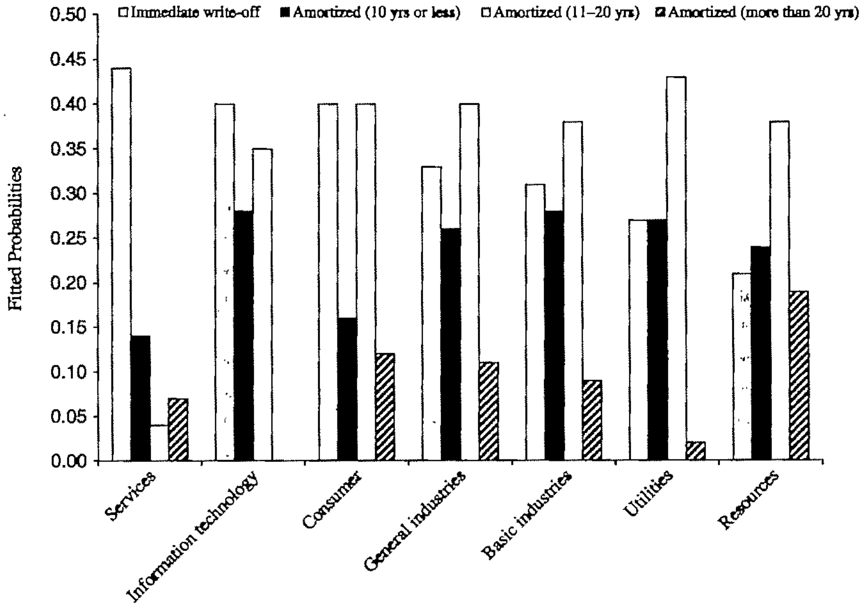
FIGURE 2

GOODWILL METHODS

Panel A: Country effects



Panel B: Sector effects



In brief, country main effects account for 23.5 per cent of the combined conditional deviance, compared with 1.5 per cent for sector main effects. When scaled, the deviance reduction for countries is more than eight times greater (8.62) than for sectors, and the country of domicile remains as by far the most influential factor also when the interaction effects are considered.

Depreciation of Fixed Assets

In this case, the basic requirement is that the depreciable amount of a tangible fixed asset should be allocated on a systematic basis over its useful life, using a method that reflects as fairly as possible the pattern in which its economic benefits are consumed. It should be recalled that, in member states such as Germany, depreciation policy choice is strongly influenced by tax considerations. In others, including the U.K., the basis of the charge for depreciation in the published accounts is independent of that used for tax purposes.

The extant accounting literature (e.g., Hagerman and Zmijewski, 1979; Skinner, 1993; Bowen *et al.*, 1995) documents significant cross-sectional association between the depreciation method and firm size, leverage and other factors such as investment opportunities and bonus plans. Moreover, managers also appear to change depreciation policies in response to tax law revisions and their own poor performance (Keating and Zimmerman, 1999), and depreciation methods are also likely to be changed in order to realign managers' incentives with those of shareholders (Skinner, 1993). Thus, as we have argued with regard to the other accounting issues covered here, it is evident that the managers of firms consider a number of factors in addition to the accounting regulations in force when deciding on depreciation methods, which again supports the call for a more developed framework for harmonization measurement in this area.

Overall, it can be seen from Panel C of Table 4 that the majority of firms in the EU used the straight-line method throughout the sampled periods. In addition, in some member states, especially Germany and France, the combination of straight-line and double-declining methods is a common practice, principally due to the potential for tax savings. In this approach, the declining balance method is used in the early years of the fixed asset's useful life and, as soon as the straight-line method yields a higher depreciation amount, the firm is likely to switch to the latter. A number of firms, particularly those engaging in resources-based industries, applied the unit-of-production method in addition to the straight-line method, in order to reflect the nature of assets appropriately. An example of this policy is illustrated by BP plc, in the following extract:

> Oil and minerals production assets are depreciated using a unit-of-production method based upon estimated proved reserves. Other tangible and intangible assets are depreciated on the straight line method over their estimated useful lives. (BP plc, Annual Report 1991, p. 33)

In the statistical analysis, depreciation methods have been categorized into straight-line, declining balance and unit-of-production. In contrast to other accounting areas investigated in this study, non-disclosure of depreciation policy is not a serious problem, that is, only 2 per cent of total sampled firms, on average, did not report their depreciation method. For the purpose of measuring harmonization, we have again treated non-disclosure of depreciation policy as non-stochastic.

Panel A of Table 7 sets out the results of the statistical analysis of depreciation harmonization when fitting the country main effect and related interaction effects. The reductions in deviance, as reported in the table, provide further evidence that the firm's country of domicile, as well as its listing status and size, are significant in determining depreciation method. The fitted probabilities depicted in Panel A of Figure 3 reflect a high degree of uniformity insofar as the straight-line method is the dominant approach across the EU. At the same time, it can be seen that the declining-balance method is favoured by firms operating in regimes where financial reporting is very much influenced by tax factors such as Germany, France and Belgium.

The impact of a firm's sector is summarized in Panel B of Table 7. Again, the p-values are highly significant, which is in line with our expectation that the nature of the assets employed in different industrial settings would be an important explanatory variable in determining depreciation policy choice. Panel B of Figure 3 illustrates that there is almost full convergence on the straight-line method across different sectors, with the declining-balance method being combined with the straight-line method in all sectors, with the exception of the resources sector where the unit-of-production method is found, as mentioned above. As with country effects, the *Sector.Listing* and *Sector.Size* interactions are also highly significant in explaining depreciation policy choice. Additionally, the *Sector.Time* interaction indicates a significant change in policy choices during the 1990s, which is mainly due to greater use of the straight-line method in the Information Technology sector.

Once again, the overall conclusion is that country effects are dominant, although this is not so with respect to the choice of the unit-of-production method (which is limited to the resources sector), as shown below for the main effects analysis:

	Straight line	Declining balance	Unit of production	Scaled mean effect
By country	–1.7	–53.6	–3.0	–19.4
	(10.6%)	(43.1%)	(13.4%)	(35.9%)
By sector	–0.7	–4.0	–25.3	–10.0
	(2.6%)	(1.8%)	(61.0%)	(10.0%)

(The figures in brackets indicate the proportion of the scaled error from Model 1 that is explained.)

In the case of depreciation, country effects account for 35.9 per cent of the combined conditional deviance, compared with 10 per cent for sector effects. The proportion of scaled deviance explained by a firm's country of domicile is almost twice (1.89) the sector main effects.

TABLE 7

STATISTICAL ANALYSIS: DEPRECIATION METHODS

Panel A: Country effects

Models and effects	Straight-line			Declining-balance			Unit-of-production		
	Deviance	DF	*F*-ratio	Deviance	DF	*F*-ratio	Deviance	DF	*F*-ratio
1. Conditional independence	202.9	1,910		1,614.6	1,910		290.7	1,910	
Main effects									
2. Country	181.4	1,898	18.75	918.0	1,898	120.03	251.7	1,898	24.52
Change in deviance	21.5	12	($p < 0.001$)	696.6	12	($p < 0.001$)	39.0	12	($p < 0.001$)
Interaction effects									
3. Country.Listing	164.9	1,885	14.51	858.9	1,885	9.98	215.6	1,885	24.28
Change in deviance	16.5	13	($p < 0.001$)	59.1	13	($p < 0.001$)	36.1	13	($p < 0.001$)
4. Country.Size	170.6	1,885	9.15	884.7	1,885	5.46	225.1	1,885	17.11
Change in deviance	10.8	13	($p < 0.001$)	33.3	13	($p < 0.001$)	26.6	13	($p < 0.001$)
5. Country.Time	178.2	1,885	2.61	894.1	1,885	3.87	249.3	1,885	1.37
Change in deviance	3.2	13	($p < 0.001$)	23.9	13	($p < 0.001$)	2.3	13	($p = 0.170$)

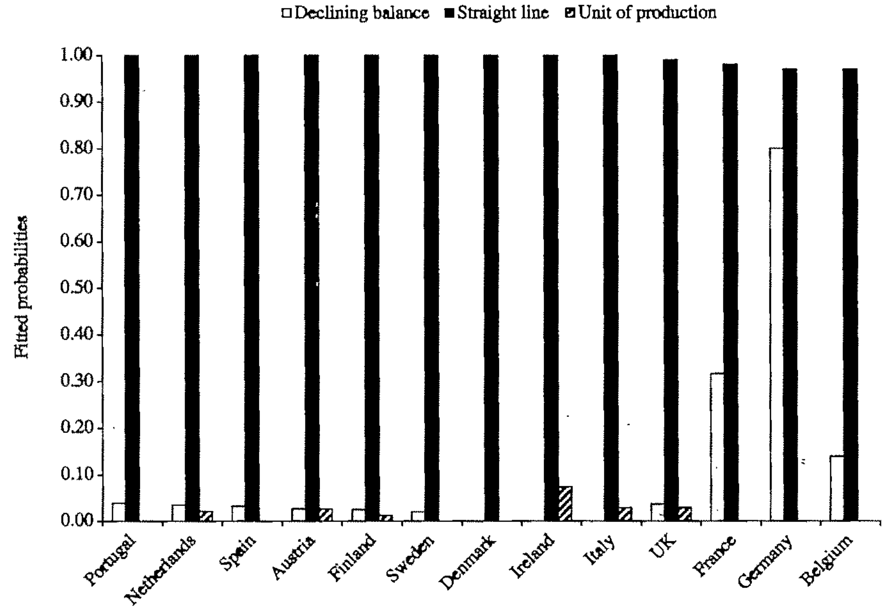
Panel B: Sector effects

Models and effects	Straight-line			Declining-balance			Unit-of-production		
	Deviance	DF	*F*-ratio	Deviance	DF	*F*-ratio	Deviance	DF	*F*-ratio
1. Conditional independence	202.9	1,910		1,614.6	1,910		290.7	1,910	
Main effects									
2. Sector	197.7	1,904	8.32	1,586.3	1,904	5.65	113.5	1,904	495.46
Change in deviance	5.2	6	($p < 0.001$)	28.3	6	($p < 0.001$)	177.2	6	($p < 0.001$)
Interaction effects									
3. Sector.Listing	190.0	1,897	10.98	1,561.2	1,897	4.36	111.4	1,897	5.18
Change in deviance	7.7	7	($p < 0.001$)	25.1	7	($p < 0.001$)	2.1	7	($p < 0.001$)
4. Sector.Size	185.2	1,897	18.28	1,571.8	1,897	2.50	108.2	1,897	13.15
Change in deviance	12.5	7	($p < 0.001$)	14.5	7	($p < 0.001$)	5.3	7	($p < 0.001$)
5. Sector.Time	192.3	1,897	7.57	1,582.7	1,897	0.62	106.5	1,897	17.84
Change in deviance	5.4	7	($p < 0.001$)	3.6	7	($p = 0.074$)	7.0	7	($p < 0.001$)

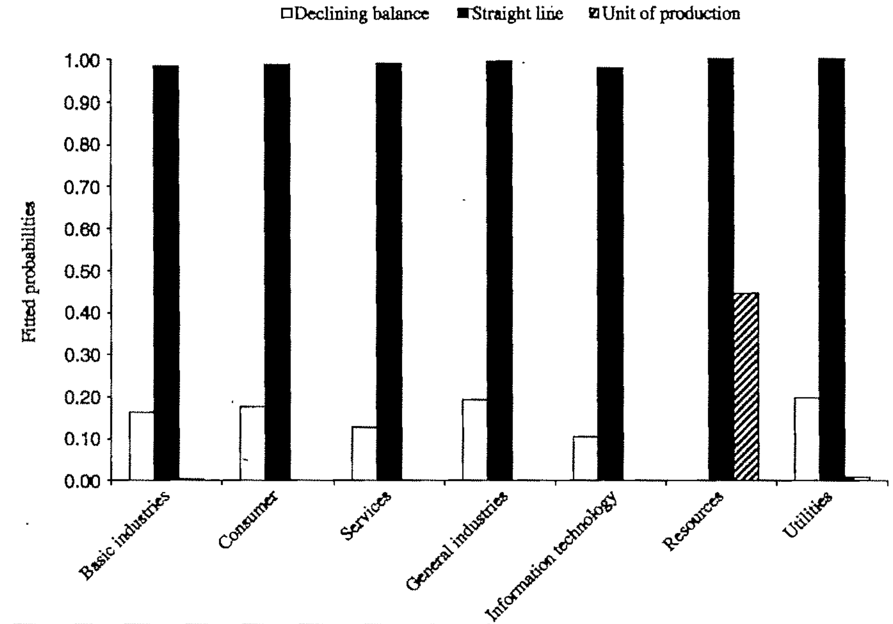
FIGURE 3

DEPRECIATION METHODS

Panel A: Country effects



Panel B: Sector effects



CONCLUSIONS

This study has attempted to reassess international accounting harmonization by taking into consideration each sampled firm's operating circumstances and other specific characteristics in addition to its country of domicile. The results demonstrate that country of domicile and sector of operations are each significant determinants in accounting policy choice across Europe. However, country differences are still far greater than sector differences, which is inconsistent with harmonized accounting.

Consistent with prior research into financial disclosure, firm-specific characteristics such as listing status and size are also significant in explaining accounting policy choice across the EU member states, although this article shows that country differences continue to outweigh sector differences even after considering these firm-level factors. We also find that, during the 1990s, a decade that saw the final implementation of European company law directives throughout the pre-enlargement EU together with the first moves towards IFRS, there was limited convergence in the adoption patterns of the accounting practices investigated here. Any harmonization that did occur had no significant influence overall on the persistence of strong country trends in accounting policy choice.

The association between firm-specific characteristics and accounting practice harmonization suggests that further care needs to be exercised in future measurement studies. This closely resembles expressions of caution found in previous published works, which have indicated that the operating conditions of different firms are important factors in the process of accounting harmonization and standardization (e.g., Perera, 1989; Ball, 1995; Barth *et al.*, 1999; Rahman *et al.*, 2002). Therefore, it is reasonable to recommend that international accounting standard setters, especially under the new IFRS regime, should not overlook firm specific attributes in individual countries in their efforts to achieve global financial statement comparability. A more comprehensive assessment of the degree of harmonization surrounding each accounting issue should be undertaken in order to provide regulators with crucial information into firm-specific reasons for policy choices. In areas where there is considerable diversity in operating circumstances, instead of obliging all firms to use the same treatment for a given accounting issue, alternative methods should be allowed. Much of the previous research in this area is misleading in this respect, as it has attempted to measure harmonization through convergence to a single method, when in fact the selection amongst different accounting treatments exists for perfectly good reasons. Indeed, comparability between financial statements requires that firms should use the appropriate method in the circumstances in which they operate, and the harmonization metric must take this into account.

Finally, it should be noted that the inferences drawn here are subject to a number of limitations. First, although the research design takes account of our expectation that, when firms diversify across different sectors, alternative accounting treatments may be required in order to reflect the differences in operating conditions, appropriate weightings have not been introduced as comparable segmented information is not available across the sample. Thus, our results take into consideration each firm's exposure to different sectors as if they are equally weighted. Second, the interlisting variable indicates only whether a firm is exposed or not exposed to international capital markets. This cannot be taken further as we do not have access to comparable data across the sample on the extent of equity market exposures. Finally, the harmonization model is evaluated with respect to each area of accounting policy separately. A useful direction for further research would be to construct a more generalized harmonization model that may account for any interactions across the full set of policy choices made by a firm.

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GEOFFREY R. FROST

The Introduction of Mandatory Environmental Reporting Guidelines: Australian Evidence

This article augments the empirical literature on environmental reporting through an analysis of the impact the introduction of mandatory reporting guidelines had on the environmental disclosures of seventy-one Australian companies. Specifically it documents three implications from the enactment in 1998 of s. 299(1)(f) of Australia's *Corporations Law* that requires companies to report on their environmental performance with respect to any 'particular and significant environmental regulation'. First, from a review of annual reports for two reporting periods prior to and two periods post the operative date of the provision, there was found to be a significant increase in the number of companies reporting and the level of information provided on environmental performance. Second, considerable variation was identified in the approaches adopted for reporting, hence confirming concerns expressed as to the practical application of the provision. Finally, there was an increase in the level of total environmental disclosure, most significantly for those companies that reported breaches of regulations and that do not issue a stand-alone environmental report. The analysis directly links increases in reporting and the introduction of s. 299(1)(f), therefore highlighting the limitations of continual reliance upon voluntary reporting to provide consistent substantive information on environmental performance. In addition, the analysis provides evidence that the introduction of additional reporting media influences the level of disclosure of environmental information within the annual report.

Key words: Disclosure; Environment; Regulation; Reporting.

This article analyses how the introduction of mandatory environmental reporting regulations affected the environmental reporting practices of Australian companies. In 1998 the Australian government enacted Section 299(1)(f) of the *Corporations Law* (reissued in 2002 as the *Corporations Act 2001* (Cth)) that requires from 1 July 1998 that companies report on environmental performance within the annual report. This was the first explicit mandatory requirement for disclosure of environmental information within the company annual report. However, s. 299(1)(f) (hereafter

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'the provision') has been controversial due to the drafting process and its perceived ambiguous requirements; subsequently the provision has faced both government and industry opposition.

This is an exploratory exercise with the aim of investigating: (a) whether the introduction of s. 299(1)(f) resulted in a change in the level of information disclosed on environmental performance with respect to any 'particular and significant environmental regulation'; (b) how have companies interpreted the requirements of s. 299(1)(f) through their disclosure practices; and (c) whether the requirement for mandatory disclosure, including disclosure on negative aspects of environmental performance, resulted in an increase in the overall level of environmental disclosure within the annual report. This article contributes to the literature by exploring the impact that mandatory reporting requirements have upon environmental reporting in general. It provides an insight into the relevance of mandatory reporting within a setting where companies already voluntarily disclose considerable environment-related information. Analysis of reporting practices offers evidence as to whether mandatory reporting guidelines can effect change in corporate environmental reporting practices, thereby increasing transparency of corporate environmental performance.

ENVIRONMENTAL REPORTING IN THE AUSTRALIAN CONTEXT

The enactment of s. 299(1)(f) provided the first instance of a mandatory reporting requirement on environmental issues to be included in the annual report of Australian companies.[1]

There was, however, an international setting, with a number of countries having introduced specific requirements for environmental reporting. For example, in Sweden firms that require an environmental permit will have to include some environmental information within their annual report (Kolk, 1999). In Norway, as required by the *Accounting Act* (NAA, 1999), if a firm has a significant environmental impact it must be mentioned in the annual report, specifically the directors' report, with explanation of the measures undertaken by the firm (Kolk, 1999). Information to be disclosed includes: environmental obligations, environmental targets, and type and amount of a number of identified environmental impacts.

From 1 January 1999 the Netherlands requires firms to produce two environmental reports; one to provide information to the public, and another to give account of compliance, which are intended for government agencies if they have serious adverse effects on the environment. The law was intended to be imposed on approximately 300 companies (EMA, 1999). In the U.S.A. the Securities and Exchange Commission requires registrants to disclose material information on environmental performance, compliance and liabilities under SEC Regulation S-K Item 101, Item 103 and Item 303 (see EPA, 2001). The European Union through the EU Accounts Modernization Directive (June 2003) states that reporting obligations for EU corporations should extend to 'where appropriate ... an analysis of environmental and social aspects necessary for an understanding of the company's development, performance or position.'

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[1] Mandatory environmental reporting has been introduced in a number of other countries, such as Sweden, Norway, the Netherlands, Denmark and France.

The Danish government in 1999 undertook a review of the effectiveness of legislation that required certain Danish companies to publish environmental information in the form of a 'green account'. This review included the analysis of 550 green accounts, interviews with managers responsible for green accounts, people with a background or interest in green accounts, the EPA, neighbours of polluting enterprises and consumers (for further details see Bebbington, 1999). Regarding the environmental reporting law generally, the review concluded positively. Of most interest, the review found that approximately '50% of the firms who undertook environmental reporting believed that they had achieved financial benefits which arose from the producing of the accounts which compensated for the costs involved' (Bebbington, 1999, p. 4). It is of note that the scope of the Danish government's review was considerably greater than the investigation by the PJSC (discussed below), and that considerable evidence was found of the financial benefits that flowed from reporting; contradicting the argument that the introduction of s. 299(1)(f) would result in considerable costs to the reporting company. Bebbington (1999, p. 4) concluded that evidence from the review of the Danish law 'points towards this form of environmental accounting as having significant benefits'. Many of the issues identified with the introduction of mandatory environmental reporting internationally have also been identified as issues of concern within the Australian context.

A number of Australian reporting requirements have previously contributed to environmental information being disclosed within the annual report. Foremost was AASB 1022, *Accounting for the Extractive Industries*, which directed Australian companies to recognize restoration and rehabilitation of abandoned mining sites. However, AASB 1022 did not require disclosure of accounting policies on restoration obligations. The 1995 Urgent Issues Group (UIG) consensus UIG Abstract 4, *Disclosure of Accounting Policies for Restoration Obligations in the Extractive Industries* (UIG 4), provided the first explicit directive for separate disclosure of a provision for restoration and the accounting policies adopted for recognition and measurement of the restoration obligations.[2] The purpose of the abstract was to clarify AASB 1022 with respect to the reporting of restoration obligations.[3]

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[2] The importance of restoration obligations is noted by the estimated A$275 million spent on rehabilitation in 1998/99, with an estimated provision for rehabilitation of A$1,208 million recognized by Australian mining companies (MCA, 1999).

[3] A study by Hardy and Frost (2001) provided evidence that the introduction of UIG 4 resulted in an increase of both the number of companies disclosing restoration obligations, and the amount of information provided. Other accounting standards, while encompassing issues that include environmental activities (such as contingent liabilities), do not explicitly target environmental issues.

As a result of the harmonization process, AASB 1022 has been replaced with AASB 6, *Exploration for and Evaluation of Mineral Resources*. Restoration obligations are not covered by AASB 6, however, but by AASB 137, *Provisions, Contingent Liabilities and Contingent Assets*, and UIG Interpretation 1, *Changes in Existing Decommissioning, Restoration and Similar Liabilities*.

While Australian regulators have not been active in introducing mandatory environmental reporting within the corporate annual report, there has been some consideration, ultimately leading to the release of a number of guidelines on the *voluntary* inclusion of environmental information. These have been developed by Australian governments (e.g., the N.S.W. EPA, 1997; Victorian PAEC, 1998, 1999; Commonwealth of Australia, 2000) and by industry groups (e.g., the Mineral Council of Australia's [MCA] *Code for Environmental Management*, 2000).[4] These initiatives, when adopted, entail a voluntary undertaking by a company, and are not subject to the audit process or the scrutiny of the Australian Securities and Investments Commission (ASIC).

An extensive literature investigating voluntary environmental disclosure by Australian companies has developed over the past twenty years. Initially environment was included as a subset of social responsibility disclosures (Trotman, 1979; Kelly, 1981; Trotman and Bradley, 1981; Pang, 1982; Guthrie and Parker, 1989), providing preliminary evidence that environmental reporting had existed for an extended period of time, and that such reporting practices were increasing over time. Research on environmental reporting evolved from the mid-to-late 1990s where it became the sole focus of a number of studies (Deegan and Gordon, 1996; Deegan and Rankin, 1996; Burritt and Welch, 1997; Brown and Deegan, 1998; Christopher *et al.*, 1998; O'Donovan, 1999; Tilt and Symes, 1999; Wilmshurst and Frost, 2000; Frost and Seamer, 2002). These studies confirmed earlier observations that progressively companies were increasing the level of environmental disclosure within corporate annual reports (Deegan and Gordon, 1996; Brown and Deegan, 1998).

The Introduction and Interpretation of s. 299(1)(f)

As of 1 July 1998 Australian company directors are required to report on their company's environmental performance. The provision states:

> 299. Annual Directors' Report—General Information
> (1) General information about operations and activities:
> The Directors' Report for a financial year must:
> (f) if the entity's operations are subject to any particular and significant environmental regulation under a law of the Commonwealth or of a State or Territory—give details of the entity's performance in relation to environmental regulation.

Non-compliance is a contravention of s. 344(1) of the *Corporations Law* and is subject to penalties, which include the director being banned from managing a company and/or being liable for a fine of up to $220,000.

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[4] The MCA's *Code* requires signatories to provide within two years 'timely and relevant information including publication of annual public environmental reports on our activities and environmental performance' (2000, p. 4). For example, both MIM (1999) and Acacia Resources Limited (1999) noted within their annual report that as a signatory they had produced their first Environmental Report (both companies also provided web addresses for their Environmental Report). As at November 1999, there were forty-four signatory companies applying the *Code* to over 300 sites (MCA, 1999, p. 25).

Reporting guidelines have also been produced by international bodies; for example, the Global Reporting Initiative (GRI) Sustainability Reporting Guidelines and AccountAbility's *AA1000 Standard*.

Section 299(1)(f) was not part of the original *Company Law Review Act*, but was tabled as an amendment by Senator Murray of the Australian Democrats (a minor political party which then had the balance of power in the Senate).[5] The amendment was supported, in principle, by the opposition Australian Labor Party; however, a number of concerns were expressed with respect to the practical application of the section (for further discussion of this opposition, see Brennan, 1998). The amendment was passed. But, owing to concerns over drafting and government opposition, the provision was referred by the Treasurer to the Parliamentary Joint Statutory Committee on Corporations and Securities (PJSC) for examination.

Due to the perceived ambiguity of the provision's requirements, in November 1998 the Australian Securities and Investments Commission (ASIC) issued Practice Note 68 (PN 68) to provide guidance for compliance. While PN 68 noted that the provision had been referred to the PJSC, it is also stated that s. 299(1)(f) was the law as at the date of the practice note. PN68.74 directives included:

1. Prima facie, the requirement would normally apply where an entity is licensed or otherwise subject to conditions for the purposes of environmental legislation or regulation.
2. The requirements are not related specifically to financial disclosures (e.g., contingent liabilities and capital commitments) but relate to performance in relation to environmental regulation. Hence, accounting concepts of materiality in financial statements are not applicable.
3. The information provided in the directors' report cannot be reduced or eliminated because information has been provided to a regulatory authority for the purposes of any environmental legislation.
4. The information provided in the directors' report would normally be more general and less technical than information which an entity is required to provide in any compliance reports to an environmental regulator.

ASIC noted that reporting practices in relation to environmental matters would evolve and that it would monitor annual reports to assess whether additional guidance was necessary. Further, ASIC stated that they 'expect full compliance with the spirit as well as the terms of the law' (PN 68.75).[6] The practice note was subsequently criticised for not providing guidance as to which companies should disclose, and what details were to be provided (Thompson, 1999, p. 246).

Concurrently the Australian Industry Group (AiG) in May 1999 issued a guidance statement to assist their members to comply with the provision (AiG, 1999). It advised that companies should use 'general information and avoid excessive detail, particularly technical information' (AiG, 1999, p. 2). Further, it suggested that 'the word "significant" should be interpreted in a broad sense and relate to what directors consider are environmental risks worthy of disclosure in the annual report' (p. 2). The AiG also indicated that 'as a general rule, 1–2 pages would be towards the maximum length of the information to be disclosed' (p. 2). Additionally, suggestions were provided as to what could be included as voluntary disclosure. The AiG (1999, p. 4) concluded: 'This is a chance to enhance Australian industry's environmental image, particularly over the long term by reporting our performances and communicating the good work on improving the environment that many companies have achieved'.

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[5] Detail of the rationale for the amendment can be found in *Hansard*, 25 June 1998.

[6] ASIC in their verbal statement to the PJSC Inquiry stated: 'We look forward to doing our surveillance on the reports, but we do not intend to take any enforcement action against companies in relation to this in the first year, unless there is obvious and intentional non-compliance' (*Hansard*, 17 August 1999, p. 204).

The PJSC Inquiry and Response to the Introduction of s. 299(1)(f)

The Parliamentary Joint Statutory Committee on Corporations and Securities (PJSC) Inquiry on *Matters Arising From the Company Law Review Act* received both written submissions (stage 1) and verbal submissions (stage 2) on the provision. Following the Inquiry the PJSC issued *Report on Matters Arising From the Company Law Review Act 1998* (Commonwealth of Australia, 1999, p. 15), which recommended that s. 299(1)(f) be deleted (see Burritt, 1999). The PJSC based their findings on the volume of submissions that opposed the provision. Of the forty-six written submissions identified by the Committee as commenting on s. 299(1)(f), forty opposed additional disclosure on environmental performance. Within the report arguments against the provision were identified under the following headings:

- Environmental reporting is inappropriate for the directors' report.
- Environmental performance should not be singled out for mandatory reporting.
- Voluntary reporting is preferable.
- The provision is vague and unclear.
- Absence of appropriate safeguards.
- Listed companies must already disclose material information.
- The provision does not apply to all legal structures.
- The provision adds an unnecessary cost.

The rhetoric of the arguments against the provision was not further analysed through a review of actual reporting practices, nor through taking into account views of the potential users of the annual report. However, the provision remains in the latest version of the *Corporations Act 2001*. Two of the arguments raised, ambiguity of the provision's requirements and adequacy of existing requirements and voluntary disclosure, are discussed below.

Ambiguity of s. 299(1)(f) Requirements and the Adequacy of Current Reporting Practices

While the PJSC identified the ambiguity of requirements for compliance with the provision as an issue of concern,[7] there was disparity from many of the submissions as to the perceived problematic nature of this issue. For example, this issue prompted the release by the Australian Industry Group of a guidance statement for their members (AiG, 1999).[8] On the other hand, when questioned as to whether the provision should be removed, both Mr Parker (representing the professional accounting bodies) (*Hansard*, 16 June 1999, p. 30) and Mr Rofe (Chairman of the Australian Shareholders Association) (*Hansard*, 18 August 1999, pp. 304–5) indicated that the provision should remain, thereby allowing observation of its influence on company environmental reporting practices. Mr Rofe suggested the provision had a 'valuable educational effect', raising awareness of the importance of environmental issues. An extract of the presentation to the hearings by representatives of the accounting profession stated that, 'at this stage ... [it is] very hard to assess what effect the law will have.... when companies report ..., we will have a much better feel then as to whether the existing requirements are appropriate or whether changes may be required' (*Hansard*, 16 June 1999, p. 26).

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[7] This reaffirmed the position taken by ASIC in the issue of PN 68.

It was also presented that it would be desirable to have a framework so as to measure the term 'performance'. This implied adoption of a 'wait and see' stance. These observations are consistent with prior research that has identified that shareholders and organizations with a review or oversight function do desire information on environmental performance, and that they seek such information from the company annual report (Deegan, 1997; Deegan and Rankin, 1997).

At issue was the nature of disclosure requirements prescribed by regulation—invoking the 'substance over form' conundrum. For example, should regulation prescribe the specific information to be disclosed and the format of disclosure, thereby reducing the discretion of the reporting entity? Such specific requirements would be difficult to apply generically for environmental reporting, given the complexities of many companies' activities and the extent of their environmental regulatory requirements. Prescribed requirements may result in minimal disclosure so as to comply with the provision's requirements, discouraging further disclosure of relevant issues. Alternatively, requirements may be general and flexible in nature, thereby allowing the reporting entity discretion as to the extent of the information to be provided. However, this also has limitations, as stated by Mr Lang, Deputy Executive Director, National Association of Forest Industries:

> Exposing your failures to public scrutiny is not a good way to maintain confidence in your company and facilitate the sale of goods or maintain access to the market for equity capital. So the effect of the requirement is to oblige them to say something but it will not necessarily lead to the full and frank disclosure that the authors of the amendment to the act might suppose. (*Hansard*, 17 February 1999, p. 23)

A number of submissions argued that existing requirements in conjunction with voluntary disclosure provided adequate information on environmental performance. Prior research has documented the completeness of environmental reporting practices, and possible factors that influence differential levels of disclosure. For example, Deegan and Rankin (1996) in an analysis of corporate reaction through disclosure to prosecution by state EPAs observed that such an event resulted in an increase in the level of voluntary disclosure. However, it was also observed that only two of the twenty prosecuted companies analysed reported on the EPA prosecution. Hence firms were substituting for poor environmental performance with voluntary disclosure of additional environmental information. Deegan and Rankin concluded (p. 2), 'that the current corporate environmental reporting practices will, on average, generate reports which would appear to be nothing short of misleading with respect to the disclosure of corporate environmental performance'. This raises the question as to how firms would react to the compulsory disclosure of their adverse performance.

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[8] The AiG also argued that there was no consistency between Australian legislation and international environmental reporting requirements.

Other major findings of research on environmental reporting in Australia suggest:

- It is primarily concentrated within what are considered the environmentally sensitive industries (Deegan and Gordon, 1996; Kelly, 1981; Pang, 1982).
- It appeared more commonly in the annual reports of larger companies (Kelly, 1981; Trotman and Bradley, 1981; Pang, 1982; Kent *et al.*, 1997).
- It was primarily of a positive nature (Deegan and Gordon, 1996; Deegan and Rankin, 1996; Kent *et al.*, 1997).

The argument that 'voluntary reporting is preferable' is undermined by continual criticism of the inadequacy (and inaccuracy) of voluntary reporting on environmental performance due to a lack of guidelines and verification (see, e.g., McQueen, 1998; Bagshaw, 2000; Adams, 2004).[9]

RESEARCH DESIGN

The enactment of s. 299(1)(f) provided an opportunity to examine the effect the introduction of mandatory reporting guidelines had on the disclosure practices of Australian companies, providing insight on the effectiveness of voluntary reporting and existing requirements in delivering information on corporate performance in relation to environmental regulatory requirements. To examine the impact of that introduction, data were collected on disclosures associated with the requirements of the provision. To analyse any possible incremental impact on environmental reporting, data on total environmental disclosures within the annual report were also collected. The following section discusses sample selection and data collection for this analysis.

Sample Selection

Sample selection was biased toward those firms most likely to be affected by the introduction of the provision. To this purpose the sample was limited to firms classified as resources (mining, oil and gas), utilities and infrastructure, or paper and packaging on the Australian Stock Exchange (ASX). These industries have previously been identified as environmentally sensitive (Deegan and Gordon, 1996;

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[9] It is interesting to note that a report issued by The Institute of Chartered Accountants of Scotland suggested that while ever environmental reporting remained voluntary, entities reporting environmental information would remain in the minority, hence there is a need for mandatory environmental reporting guidelines (Gray *et al.*, 1998, p. 111).

Frost and Wilmshurst, 2000), therefore more likely to be governed by regulation and legislation on environmental issues; and hence, more likely to be required under s. 299(1)(f) to report on environmental performance. On the other hand, if the argument was valid that existing reporting requirements and voluntary reporting were adequate, then we would be less likely to observe any significant change in reporting practices for companies that operate in industries previously identified as significant disclosers of environmental information.

Data were collected for the following reporting periods:

1. Penultimate pre-operative period—the penultimate annual report issued prior to the effective date (pre 1 July 1998).
2. Ultimate pre-operative period—the last annual report issued prior to the effective date.
3. First operative period—the first annual report issued on or after the effective date (post 1 July 1998).
4. Second operative period—the second annual report issued after the effective date.

Analysis of the pre- and operative periods enables comparison of how the provision affected reporting practices. The second operative period analysis provided additional data on how companies interpreted s. 299(1)(f) and the provision's longer term effectiveness. The penultimate pre-operative period enabled a greater understanding of changing reporting practices by the sample companies. The Connect 4 Annual Report File was utilized to identify those companies that had annual reports for the four periods.[10] A final sample of seventy-one companies was analysed (listed in Appendix A).

Content Analysis

Categories of Disclosures Associated With s. 299(1)(f) Compliance Disclosure practices data were collected through content analysis of the annual report. This technique has been widely used in determining the extent and nature of reporting practices (Adams and Harte, 1998; Gray *et al.*, 1995; Guthrie and Parker, 1990; Hardy and Frost, 2001; Wilmshurst and Frost, 2000). The research instrument developed was based upon issues that *may be disclosed to comply with* s. 299(1)(f) as identified by a review of (a) guidance releases provided by ASIC (1998) and the AiG (1999), and (b) extant literature that has examined the provision (Deegan, 1999, 2000; Thompson, 1999).

The annual reports were examined for disclosure on the following issues which formed the categories for analysis:

- *Identification of significant environmental regulations*: divided into two categories—*general* and *specific*. To be classified as a specific disclosure, the specific legislation or regulations with which the company must comply is identified.

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[10] Connect 4 is an electronic database of annual reports. The Annual Report Collection includes annual reports of the Top 500 companies listed on the ASX based on market capitalization. As such, the conclusions are only generalizable for relatively larger companies.

General disclosures are those where the company stated that they did not have to comply with any significant environment legislation or regulation, or that they did have to comply or had a policy in place to comply without identifying the most relevant environmental regulations or legislation.

- *Specification of the level of compliance*: whether they comply with relevant regulations, or identify that there has been some non-compliance during the reporting period (referred to as breaches in the following text). If non-compliance is identified, further detail may be provided, for example:
  (i) *number of breaches of regulations*: perhaps a raw number, or rating breaches with respect to severity of the incident, then identifying the number of breaches at each level;
  (ii) *specific breach*: identify that licensing conditions at a certain site were breached, or there was a breach of a specified Act or regulation; and
  (iii) *penalties incurred*: for each breach, this may include financial penalties such as fines or court orders.
- *Remedial action*: actions undertaken so as to avoid future breaches of the regulations. The AiG (1999, p. 2) suggested that 'performance of the company in managing its environmental risks is also a requirement'.

Section 299(1)(f) required disclosure in the Directors' Report, however the AiG (1999: 3) stated that 'environmental information can be placed anywhere within the annual report, except within the financial statement, but must be referred to within the Director's section'. Such advice could create additional variation in disclosure; hence analysis of the annual report (with respect to identification of significant environmental regulation) is further categorized as:

- Directors' report or corporate governance section (statutory sections) which is the required regulatory section of the annual report, and
- Environment section or other voluntary disclosures (voluntary sections), which is particularly important for the pre-operative periods where disclosure on the identified issues was of a voluntary nature.

To provide corroborative evidence of whether companies were reporting fines and prosecutions imposed because of breaches in environmental regulations, an analysis of Australian State EPA annual reports was undertaken for the period 1997–2000.[11] While infringement notices are recorded in aggregate in the EPAs' annual reports, given the small number of successful prosecutions, they are reported separately. Data on prosecutions for the period 1997–2000 for New South Wales, South Australia, Victoria and Western Australia are reported in Appendix C.[12]

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[11] The state EPAs are primarily responsible for enforcement of state environmental regulations.

[12] For N.S.W., S.A. and Victoria, the relevant state EPA was the prosecuting body. For W.A. it was the Department of Environmental Protection.

Analysis of Total Disclosures

The third objective was to investigate whether the introduction of mandatory reporting resulted in an overall change in the level of environmental disclosures within the annual report. Further analysis is provided on (a) total disclosures for the full sample, and (b) total disclosures by firms that reported breaches of environmental regulations.

As noted, the annual reports of the seventy-one companies were analysed to identify total environmental disclosures for the four-year period. Environmental disclosure is defined for this study as disclosure of a relationship between the entity and the physical environment, including energy usage, waste, and actual physical impact.

For analysis of the level of environmental disclosure, a total word count was utilized—consistent with prior research (see Zeghal and Ahmed, 1990; Deegan and Gordon, 1996; Deegan and Rankin, 1996; Neu *et al.*, 1998; Wilmshurst and Frost, 2000; Frost and Seamer, 2002). Disclosures relating to the issues covered by s. 299(1)(f) were also identified. This enabled analysis of whether the total level of disclosure was affected by the introduction of s. 299(1)(f). The design does not, however, provide detail as to whether the content of disclosure (outside of issues identified as relating to the provision) changed as a result of the introduction of the provision.

Firms that recognized a breach in regulations for the first time in the initial operative period were identified (these are listed in Appendix A) for further analysis to determine how this influenced their total disclosures. This sample did not include the nine companies that recognized breaches of regulations in both pre- and operative periods or BHP.[13] A separate analysis of the forty-four firms that did not recognize a breach in either the pre- or operative period was also undertaken.[14]

Finally, negative disclosures relating to the environment were identified. This was undertaken to explore whether the introduction of the provision resulted in significant change in the level of negative disclosures. The examination of bias on environment disclosures has been undertaken in a number of studies (Hogner, 1982; Gray *et al.*, 1995; Deegan and Gordon, 1996; Deegan and Rankin, 1996), with prior research observing that Australian companies have tended to provide limited negative disclosures (Deegan and Gordon, 1996; Deegan and Rankin, 1996) and that prosecution has resulted in a significant increase in the level of total environmental disclosures (Deegan and Rankin, 1996).

During the period of analysis a number of companies issued separate environmental reports. For some companies this resulted in a subsequent decrease in the level of disclosure on environmental issues in the annual report (for example, the quantity of disclosure within the annual report of BHP changed from 4,806 to 2,714 words with the issue of their first environmental report). To control for the impact of the release of an environmental report, data for forty-seven companies that did not issue an environmental report were partitioned and reported separately.[15]

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[13] These companies were willing to disclose on a voluntary basis, hence are less likely to be influenced by the introduction of the provision. BHP was excluded as they issued their first environmental report in the first post-operative period, resulting in total disclosures decreasing from 4,806 to 2,714 words (but more importantly s 299(1)(f) related disclosures decreased from 4,252 to 2,566 words).

[14] Only the two periods straddling the transition period were analysed as the sample of firms recognizing breaches in the second post-operative period changed.

Coding Method

The analysis of content for the full sample was undertaken by a single experienced coder. To reduce coding errors the analysis was limited, as noted above, to two categories (*Identification of significant environmental regulations* and *Specification of the level of compliance*), with the second category having four sub-categories. The location of the disclosure in many cases further assured reliability of coding as such disclosure was normally included in the directors' statement under a specific heading (e.g., environmental compliance reporting). General environmental content was not broken into themes but kept as a single category, hence reducing the possibility of inter-coder errors in interpreting content. Initially content was coded by sentence, and then measured by a word count. The coder was required to make a judgment as to the nature of the disclosure (i.e., negative vs positive). Negative disclosures are defined as any disclosure that recognizes an adverse impact upon the environment from the firm's operations. This follows Gray *et al.* (1995, p. 99), 'any statement which reflects/might reflect discredit on the company'.

To provide assurance on consistency in analysis and interpretation of the categories (definitions of the categories are provided in the previous section) an initial sample of twenty companies was independently analysed by two researchers.[16] This analysis identified and highlighted all text relating to environmental issues, and disclosure that could be related to the requirements of the provision. Minor variations in observations were identified, and then re-examined by the author to determine whether the variation was due to interpretation problems with categories or an error in analysis. Due to the nature of mandatory reporting requirements and the simplicity of categories employed, few errors were originally recorded in the analysis of the initial sample.

RESULTS

Environmental Compliance

The results of the analysis of the identification of significant environmental regulations are reported below in Table 1.

The introduction of s. 299(1)(f) resulted in a significant increase in the recognition of environmental regulation within the statutory sections, with a subsequent decline of disclosure in the voluntary section. Of interest is the significant decrease from the penultimate to the ultimate pre-operative period. However, although the number of companies disclosing increased, there was considerable

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[15] Data on companies that issued an environmental report are included in Appendix A.

[16] A sample of twenty reports is the minimum benchmark recommended by Milne and Adler (1999).

TABLE 1

NUMBER OF COMPANIES THAT IDENTIFIED SIGNIFICANT ENVIRONMENTAL REGULATIONS ($n = 71$)

	Penultimate pre-operative period	Ultimate pre-operative period	First operative period	Second operative period
Statutory sections				
General	11	4	49	49
Specific	0	0	15	16
Voluntary sections				
General	18	12	8	9
Specific	6	1	3	2
Total disclosing companies[a]	*33*	*17**	*67***	*68*

** Significant at the 0.001 level using a x^2 test, * Significant at the 0.05 level using a x^2 test.
[a] A number of companies disclosed in both the statutory and voluntary sections of the annual report.

variation in how such regulations were recognized in the operative period. For example, Anaconda Nickel briefly acknowledged that it had complied with certain regulatory requirements (its only observed disclosure) whereas Centennial Coal Company identified that they complied with regulations from government bodies including the N.S.W. Environmental Protection Authority, Department of Mineral Resources, Department of Urban Affairs and Planning, Department of Land and Water Conservation; Queensland Department of Mines and Energy, Department of Environment and Department of Water Resources. Santos provided greater detail by identifying that they were required to comply with 'some 34 State and Commonwealth Acts and licences', and then proceeded to list the most important of the regulations.

While considerable variation was observed in recognition, of more interest were the companies in the operative periods not disclosing any information on environmental regulations within the statutory sections—seven in the first period, six in the second. This corresponds with the AiG recommendation. Further, a number did not recognize any significant environmental regulation; these included St Barbara Mines (first period), Placer Dome (second period) and Carter Holt Harvey (both periods). What differentiates the last two companies is the significant proportion of their operations outside Australia, hence providing some insight as to the limits of how 'particular and significant environmental regulation under a law of the Commonwealth or of a State or Territory' is being interpreted. Whether without recognition of environmental regulation these companies remain within ASIC's 'spirit of the law' has not been tested.

The next step entailed analysis of disclosures on the level of compliance with environmental legislation and regulation. Results are reported in Table 2.

TABLE 2

NUMBER OF COMPANIES THAT SPECIFIED THE LEVEL OF COMPLIANCE ($n = 71$)

	Penultimate pre-operative period	Ultimate pre-operative period	First operative period	Second operative period
Statutory sections	1	1	54	53
Voluntary sections	11	12	13	21
Total disclosing companies[a]	*12*	*13*	*62**	*61*
Companies reporting non-compliance	*7*	*9*	*27**	*29*

[a] A number of companies disclosed in both the statutory and voluntary sections of the annual report.

Although a significant increase in the number of companies recognizing compliance with environmental regulations is reported, many firms simply stated that they were in compliance with the relevant regulations. This increase produced some interesting disclosures. For example, Spicers Paper Limited stated that, although not subject to significant regulation and legislation, it complied with all environmental obligations. Of most interest, however, was the diversity in the reporting of non-compliance. The significant changes in the level of disclosure correspond with previous observations of firms' reluctance to disclose negative aspects of their environmental performance (see Deegan and Rankin, 1996), and suggests that, without a directive, such disclosure was limited. For example, in the pre-operative period the Victorian EPA reported that Amcor was prosecuted on 24 April 1998; however, this was not disclosed in Amcor's 30 June 1998 annual report. The N.S.W. EPA reported that Caltex Refineries was prosecuted in the Land and Environment Court for an incident by Ampol prior to the company taking control of Ampol's operations. Again this incident was not disclosed. Caltex and Amcor's non-disclosure is explained as this period was still pre-operational of s. 299(1)(f). The lack of disclosure, however, reinforces the observation that companies were not disclosing prosecutions prior to enactment of the provision. Further, the prosecution of Caltex related to an incident in a prior period and at a time when Caltex did not control the site; arguably due to the ambiguous requirements of s. 299(1)(f), a prosecution relating to a prior period may not be disclosed.

For the first operative period the N.S.W. EPA prosecuted BHP (on a number of occasions) and Capral Aluminium. A review of BHP's annual reports found that all but the latest two prosecutions were clearly disclosed, with details provided on the location of the incident and the penalty imposed (this can be confirmed from the data provided in Appendix B for prosecutions relating to the 1998/99 period). Arguably the latest two prosecutions occurred after the reporting period, hence they were not yet captured within the annual report. Capral Aluminium on the other hand disclosed general details on the prosecutions in the Land and Environment Court within the Environment (voluntary) section of the annual report. This observation further highlights the problem of where within the annual report

TABLE 3

DISCLOSURE OF SPECIFIC INFORMATION ON BREACHES OF ENVIRONMENTAL REGULATIONS

Number of companies that:	Penultimate pre-operative period ($n = 7$)	Ultimate pre-operative period ($n = 9$)	First operative period ($n = 27$)	Second operative period ($n = 29$)
• Quantified the number of breaches	5	7	19	21
• Specified the type of breach	5	6	24	23
• Specified the penalty for the breach	2	2	7	7
• Identified remedial action	3	3	20	22

companies should disclose. The prosecution of Capral is also of interest as the breaches occurred in January, March and September 1997, prior to the introduction of s. 299(1)(f), highlighting the appropriate time to report. Acknowledgment prior to court proceedings being finalized may be inappropriate, for in many cases a prosecution may be appealed and overturned, whereupon no conviction or infringement is recorded. These observations of prosecutions, in conjunction with the increased number of companies recognizing that breaches had occurred, highlight the 'success' of s. 299(1)(f) in forcing companies to report on the details of performance relating to environmental regulations.

To summarize, the introduction of s. 299(1)(f) did result in an almost universal recognition, within the sample, of significant environmental regulations. Second, consistent with requirements of the provision, the sample companies are now recognizing breaches of environmental regulations.

Disclosures on Breaches of Regulations

The disclosure of further information on recognized breaches of regulations is reported in Table 3.

In the operative periods many companies disclosed details on breaches of regulations. However, given the lack of guidance as to the nature of information required, myriad approaches emerged. For example, BHP reported the number and amount of fines and prosecutions incurred in tabular format. It also provided detail on the number of environmentally significant incidents that occurred in each of the company's businesses (reproduced in Appendix B). In disclosing the number and type of breaches, some companies used severity ratings of environmental impact; for example, Comalco[17] and Centennial Coal Mines rated breaches, but not the specifics of the incidents. Centennial used a four-point incident scale, starting with ten incidents of non-compliance with internal policies and procedures. Such disclosures imply that reporting of non-compliance was extended beyond regulatory requirements to include internally generated performance standards. Alternatively, Ross Mining discussed compliance by site, noting a specific breach and the imposed penalty of $600.

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[17] Comalco directed users to a forthcoming environmental report for further details of the incidents.

Companies when recognizing a breach usually disclosed additional information (with the exception of two companies in the first operative period that recognized a breach without providing any additional detail). Table 3 shows that the majority of companies provided additional detail on the number of breaches and the type of breach. However, only three companies in the first operative period and four in the second provided information on all six categories analysed. Hence, observed disclosure in the operative periods indicates that although companies are interpreting s. 299(1)(f) to require recognition of breaches, it does not necessarily translate to full disclosure of the details.

Of the twenty-seven companies identifying breaches within the first operative period, only seven identified the penalty associated with that breach (Table 3). However, it is recognized that many companies reported that such breaches were minor and resulted in no penalty being incurred. The reported monetary penalties in relation to fines may appear to be trivial when compared to the total resources of the company,[18] yet the ASIC Practice Note makes it clear that the 'immaterial' nature of the amount cannot be used as a rationale for non-disclosure. PN68 distances the concept of materiality from the definition of significance, hence companies may need to recognize an environmental infringement regardless of the cash flow consequences (for further discussion of 'materiality' versus 'significant' see Deegan, 1999, p. 475). As a result, one might expect that companies would disclose on infringements regardless of the financial implications, with the level of recognition only tempered by the company's interpretation of significance due to the ambiguity of the provision. In other words, as suggested by the Australian Industry Group (1999), directors should use their judgment in determining the significant nature of an incident.

Of the fifty-six instances of companies reporting a breach of regulations in the operative periods, forty-two disclosed details on actions undertaken so as to remedy the adverse conditions created by the breach. Again, this does not necessarily translate into full disclosure. For example, Consolidate Rutile reported 'all incidents have been addressed and closed out or included in programs to prevent similar occurrences in the future' and Eastern Aluminium reported 'solutions have been implemented or are in the process of implementation'. With respect to a significant breach, Centennial Coal Company reported 'The Level 2 incident (*Level 1 being the most severe*) relates to the current water management issue at Clarence Colliery . . . Centennial is working closely with relevant regulatory authorities and the proposed new system will provide significant environmental benefits to all stakeholders' (2000, p. 24; italics added). Further details of the incident were provided within the statutory section. Normandy Mining in response to seepage from a tailings dam reported that remedial work was being undertaken and provided

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[18] See Appendix B for details of fines incurred by BHP, with other companies such as Amcor reporting fines of $600, or companies reporting breaches but no subsequent penalties.

Table 4

ENVIRONMENTAL DISCLOSURES (AVERAGE NUMBER OF WORDS) ($n = 71$)
AND COMPANIES WITHOUT ENVIRONMENTAL REPORTS ($n = 47$)

	Penultimate pre-operative period	Pre-operative period	First operative period	Second operative period
Total disclosure[a]	467	501	773*	757
	(212)	(276)	(498*)	(581)
Disclosure related to Section 299(1)(f)[b]	98	99	273**	263
	(28)	(26)	(180*)	(218)
Negative disclosures[c]	59	52	77*	77
	(2)	(4)	(27*)	(38)

[a] From the full sample, 55 companies (77%) increased the total disclosures over the period analysed. Of those companies that did not release a stand alone environmental report, 40 (85%) increased total disclosures.

[b] With respect to disclosures relating to the provision, 66 companies (93%) of the full sample increased disclosures. From the sub sample of companies that did not release a stand alone environmental report, 45 (96%) increased disclosures relating to the provision.

[c] Only nine companies made negative disclosures in the penultimate period; this increased to 30 companies for the second operative period.

** Significant at the 0.001 level (Mann-Whitney test), * Significant at the 0.005 level (Mann-Whitney test).

Note: A Mann-Whitney test was used given the non-normal distribution of the data. The significance was confirmed using a 2 tailed t-test.

an expected date of completion. Additional disclosure on remedial actions was typically limited to a superficial acknowledgment of a response rather than detail of the extent of that response, or likelihood of a re-occurrence of the breach. Yet these disclosures may partially reassure investors that actions were undertaken to remediate the underlying cause of the breach.

To summarize, the introduction of s. 299(1)(f) has been instrumental in the increased provision of information on the nature of breaches in environmental regulations. However, while additional information on breaches is provided there is still only limited reporting of the penalties imposed for such breaches.

Total Volumes of Disclosure

Table 4 reports the total disclosure (by number of words) for the seventy-one companies. Observations for the forty-seven companies that did not issue an environmental report are included in brackets.

Table 4 reports significant changes in disclosures relating to the provision from the pre- to operative period, corresponding with the previous results. There has also been a corresponding increase in the level of total environmental disclosures. Of interest from the results is that disclosures in all categories (total and negative) were somewhat consistent in the periods pre- and post-application of the provision, with only the transition period showing a significant change in disclosure.

TABLE 5

ENVIRONMENTAL DISCLOSURES (AVERAGE NUMBER OF WORDS) FOR COMPANIES REPORTING A BREACH IN THE FIRST OPERATIVE PERIOD ($n = 17$) AND FOR COMPANIES THAT REPORTED NO BREACHES ($n = 44$)

	Pre-operative period	Operative period
Total disclosure	279	710***
	(349)	(584*)
Disclosure related to Section 299(1)(f)	19	330***
	(19)	(156***)
Negative disclosures	3	79***
	(4)	(12)

*** Significant at the 0.001 level (Mann-Whitney test), ** Significant at the 0.005 level (Mann-Whitney test), * Significant at the 0.05 level (Mann-Whitney test).

Notably, once companies that produce a stand-alone environmental report were excluded from the analysis a consistent increase in total disclosures over the four periods was observed, punctuated again by a significant increase in disclosures in the transition period. In other words, environmental disclosure within the annual report was not increasing at the same rate for companies with a stand-alone environmental report. Hence, the results provide insight into the use of the annual report, for it cannot be suggested that companies with a stand-alone environmental report are disclosing less, they are simply using an alternate media to report environmental performance.[19]

Table 5 analyses companies that recognized a breach only in the first operative period and those companies that did recognize any breaches (reported in brackets).

There was a significant increase in the level of disclosure for companies that reported a breach, which was much greater than the level of increase for companies that did not identify any breaches. This was particularly the case with negative disclosures, where only for those companies that recorded a breach was there a significant change observed. The results are consistent with those of Deegan and Rankin (1996): Firms prosecuted by the EPA were more likely to increase their disclosure and have a greater focus on positive environmental performance. Prior to enactment of s. 299(1)(f) the level of reporting was comparable. In the operative period the companies with breaches increased provision-related disclosures by an average of 311 words, hence total disclosure not related to the provision increased by only 120 words; whereas for companies with no reported breaches, provision-related disclosures increased by 137 words with total disclosures not related to the provision only increasing by 98 words. Thus, the increase in total disclosure can be explained in part by the increased disclosure relating to the provision. This is particularly the case with respect to negative disclosures. The results indicate that the provision has been effective in increasing negative disclosures (both proportionally and in quantity). Such a finding suggests that transparency of corporate performance has increased as a result of the introduction of the provision.

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[19] It is also noted from the analysis that a number of companies in the later periods referred the reader to their corporate website for further information on environmental performance.

In summary, the introduction of s. 299(1)(f) is associated with a significant increase in total level of environmental disclosure. This is consistent with prior research (Deegan and Rankin, 1996) that observed an increase in disclosure by firms successfully prosecuted for environmental breaches. The increase in disclosure can also be directly related to the information required by s. 299(1)(f). This increase in reporting activity is most obvious for firms that did not produce a stand-alone environmental report over this period, and for companies that reported a breach in the first operative period.

CONCLUSIONS

This study investigates whether the introduction of s. 299(1)(f) had increased the level of disclosure on environmental performance, and second, how companies were interpreting the provision given stated concerns as to its practical application. While companies did not explicitly identify that the provision directly resulted in a change in reporting practices, the evidence and analysis shows that, consistent with compliance with the provision, many companies for the first time disclosed information under the heading of environmental performance within the statutory section of the annual report. Additionally, while there was a progressive increase in environmental disclosure (and a significant increase in the *operative period*), the evidence and analysis confirms that under the prior voluntary regime many companies had failed to disclose regulatory breaches (consistent with Deegan and Rankin, 1996), whereas prosecutions *post-application* were reported within the defendants' annual reports. Hence the provision was successful in increasing the transparency of corporate environmental performance, particularly where companies had breached regulations. The fact that companies were now disclosing on negative environmental performance may in itself have been the catalyst for increased total disclosures (as observed by Deegan and Rankin, 1996).

With increased transparency, annual report users interested in environment performance are now more informed. It is noted that information on prosecutions has previously been available, but not as easily accessible as in the annual report. Further, firms are now providing additional commentary on the impact breaches of regulation are having upon operations. However, in terms of useful information, the provision predominantly highlights adequate performance by the majority of companies. It is only for the minority of companies with regulatory breaches that the provision has resulted in additional information. The provision has introduced some standardization of disclosure on performance in an area where companies in the past have been reluctant to disclose. It does not, however, provide further insights as to risks of the firms' operations, or perhaps of the financial implications of poor environmental performance (beyond the disclosure of fines by a small number of companies). It is beyond the scope of this study to test the actual usefulness of this information to users of the annual report.

With respect to the second aim, although there was a significant increase in disclosure, the variation in the extent of disclosure and the presentation of information suggests that considerable differences regarding the interpretation are afforded by s. 299(1)(f). Whereas some of this could be attributed to the differences in guidelines provided by various bodies, it also confirms concerns expressed by a number of parties as to how practical its application would be. This is most evident, first, in that a number of firms did not recognize any significant environmental regulation even though they operate in industries and regulatory environments similar to those in many of the disclosing companies. This raises questions as to whether non-disclosing companies are complying with the spirit of the law (as required by the ASIC, 1998). Second, concerns are raised by the differences as to what regulations were recognized by the sample companies as significant. Third, concerns arise due to the number of firms that opted for disclosure of environmental performance issues outside of the statutory section of the annual report. Finally, concerns arise over the detail provided with respect to breaches that were recognized. This was most evident with respect to details on the penalties incurred and remedial actions undertaken. It was also noted that a number of companies that had recently issued their first environmental report were directing report readers to either its hard copy or on-line form for further details on performance with respect to significant environmental regulation.

The provision has resulted in increased recognition of environmental performance with respect to environmental regulations. This increase indicates voluntary disclosure coupled with existing regulation was inadequate as a means of forcing companies to report on the level of compliance with environmental regulations. If such disclosure on performance is deemed desirable, then the argument of the PJSC that 'voluntary reporting is preferable' and by the written submissions suggesting that other current regulation was sufficient is not supported by the observed reporting practices of the companies surveyed. The increase in disclosure from the pre- to operative periods invites additional questions as to the validity of the argument by the PJSC that 'companies must already disclose material information', for if this were so, no significant change in the level of disclosure should have been observed. Alternatively, s. 299(1)(f) could have inadvertently raised external stakeholder and corporate management awareness of environmental issues, resulting in the disclosure of possible relevant information to avoid further scrutiny. For example, Spicers Paper (1998) reported that although they were not subject to significant environmental legislation or regulations, they complied with all environmental regulations. On the other hand, such variation may be the result of differing interpretations of 'material' in contrast with 'significant' (as noted by ASIC).

Finally, the study investigated whether introducing a disclosure requirement about environmental performance, including negative performance, had a subsequent impact on total disclosures within the annual report. Prior research has observed a long-term continuing increase in total disclosures. And, while such an increase was observed, for the total sample it was not consistent. However, once firms with a stand-alone environmental report were excluded from the analysis, a consistent increase was observed. This suggests that firms are using the annual report as part of a range of disclosure media, and that for many companies it may not be the most significant means of communicating on environmental performance. The analysis of total disclosures revealed a significant increase coinciding with the application of the provision, which was most pronounced for those companies that recognized a breach in the first operative period. While the increase in disclosure was significant, most of the increased disclosure related to information interpreted as required by the provision, hence suggesting that firms are providing greater detail of performance relating to regulations rather than 'distracting' the reader with additional disclosure on unrelated environmental issues. These results suggest that the introduction of s. 299(1)(f) partially explains increasing levels of environmental disclosure, most significantly for information relating to the provision. The analysis and evidence provides a point of departure for future research that investigates corporate activities to resist the mandating of environmental reporting, the capacity of firms to measure and report on environmental performance, and finally the changing scope of the media adopted by companies to disclose environmental performance information.

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APPENDIX A

LIST OF SAMPLE COMPANIES

1 Acacia Resources[b,c]
2 Amcor Limited[a]
3 Anaconda Nickel Limited
4 Ashton Mining
5 Astro Mining NL
6 Auiron (previously Meekatharra Minerals NL)
7 Aurora Gold Limited[a,c]
8 Australian Gas Light Company
9 Australian Magnesium Company (previously Queensland Metals Corporation Ltd)[a]
10 Beaconsfield Gold NL
11 Bendigo Mining NL[a]
12 Bligh Oil & Minerals NL[a]
13 BHP[a,c]
14 Caltex Australia Ltd[b,c]
15 Capral Aluminium Ltd[a]
16 Carlton Investments Ltd
17 Carter Holt Harvey Ltd[c]
18 Centaur Mining & Exploration Ltd[a,c]
19 Centennial Coal Company Ltd[a]
20 Central Norseman Gold[a,c]
21 Central Pacific Minerals NL
22 Climax Mining Ltd
23 Coal & Allied Industries Ltd[a]
24 Comalco Ltd[a,c]
25 Consolidated Rutile Ltd[b,c]
26 Cumnock Coal Ltd
27 Delta Gold NL[c]
28 Diamond Rose
29 Eastern Aluminium Ltd[a]
30 Emperor Mines Ltd
31 Energy Development Ltd[a]
32 Energy Equity Corporation Ltd
33 Energy Resources of Australia Ltd[b,c]
34 Equatorial Mining Ltd
35 Goldfields Ltd[a,c]
36 Haoma Mining Ltd
37 Hills Motorway Group
38 Johnson's Well Mining NL
39 Kidston Gold Mines Ltd[c]
40 Magellan Petroleum Australia Ltd
41 MIM Holdings Ltd[c]
42 Mosaic Oil NL
43 Newcrest Mining Ltd[b]
44 Normandy Mining Ltd[b,c]
45 Normandy Mt Leyshon Ltd[c]
46 Normandy NFM Ltd[c]
47 Novus Petroleum Ltd
48 Oil Company of Australia Ltd[a]
49 Oil Search Ltd
50 Pacific Hydro Ltd
51 PacMin Mining Corporation Ltd
52 Pasminco Ltd[b,c]
53 Perilya Mines NL
54 Placer Dome Inc[c]
55 Portman Mining Ltd
56 QCT Resources Ltd
57 Ranger Minerals Ltd
58 Resolute Ltd
59 Rio Tinto Ltd[b,c]
60 Santos Ltd[a]
61 Sipa Resources International NL
62 Sons of Gwalia Ltd[a,c]
63 Southern Pacific Petroleum NL
64 Spicers Paper Ltd
65 St Barbara Mines Ltd
66 Tap Oil NL
67 Ticor Ltd[c]
68 Transurban Group Ltd
69 Western Metals Ltd
70 WMC Ltd[b,c]
71 Woodside Petroleum Ltd[c]

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[a] Recorded a breach in the first operative period.
[b] Recorded a breach in both pre- and first operative period.
[c] Produced a stand-alone environmental report within the period analysed.

APPENDIX B

BHP'S DISCLOSURE ON ENVIRONMENTAL PERFORMANCE WITHIN THE CORPORATE GOVERNANCE SECTION OF THE ANNUAL REPORT

Environmental Performance

BHP is committed to a high standard of environmental performance and regularly issues comprehensive reports on its performance in this area.

In accordance with the *Corporations Law*, information is set out below in relation to:

- the number and amount of fines and prosecutions incurred by the BHP Group under environmental laws and regulations (Table A1); and

TABLE A1

ENVIRONMENTAL FINES AND PROSECUTIONS 1998–99

BHP business	Fines
Minerals	• Cordeaux Colliery, Australia, received a $500 on-the-spot fine in July 1998 for an unlicenced discharge of water. • San Juan coal mine, United States, received a US$2 350 fine in January 1999 for failure to comply with the terms and conditions of environmental permit 94-01. • Pinto Valley copper mine, United States, paid the remaining portion (US$93 000) of the stipulated penalty total amount of US$558 000 in regard to the tailings and waste rock incident which occurred in October 1997 (note that US$465 000 was paid in 1997–98 in relation to the incident).
Steel	• Port Kembla steelworks, Australia, received six penalty notices, totalling $3,300, relating to the following four incidents: drain discolouration (incident occurred in June 1998; received two $500 fines in September 1998); discharge of dirty water (incident occurred in November 1998; received two $600 fines in January 1999); coke ovens air emissions (incident occurred in December 1998; received a $500 fine in January 1999); and drain discolouration (incident occurred in January 1999; received a $600 fine in May 1999). • BHP Building Products, Smithfield, Australia, received a $500 fine in September 1998 for the late submission of their licence certificate of compliance to the Environmental Protection Authority (N.S.W.). • Newcastle steelworks, Australia, received a $600 fine in October 1998 for an air emission incident that occurred in June 1998. • Coated Steel International, Kalama, United States, received a penalty notice (no fine imposed) for an acid spill that occurred in May 1999.
Petroleum	• West Cameron, United States, received a notice of violation (including a US$500 fine) in August 1998, for an incident involving a condensate spill of half a barrel that occurred in August 1998.
Services	• Marine Fuels, Port Kembla, Australia, received a $125 on-the-spot fine relating to an incident which occurred in August 1998, where black smoke emissions contravened the Clean Air Act (N.S.W.).

TABLE A2

REPORTED ENVIRONMENTALLY SIGNIFICANT INCIDENTS 1998–99

BHP business	Severity rating		
	3	4	5
Number of significant incidents			
Steel	13	0	0
Petroleum	2	0	0
Minerals	2	0	0
Services	0	0	0

- the number of environmentally significant incidents (including non-compliances) that occur in each of the businesses making up the BHP Group (Table A2).

The figures presented in Tables A1 and A2 cover BHP's worldwide operations.

1. Table A2 presents the number of environmentally significant incidents reported by each BHP Business to have occurred in 1998–99. Incidents are required to be reported to BHP Corporate, and only those incidents that were reported are included in the table.
2. Incidents are included on the basis of the severity of their impact on the environment using BHP's internal severity rating scale (tiered 1 to 5 in order of increasing severity). Only those incidents of a severity deemed to be significant (severity ratings 3 to 5) are included in Table A2.
3. Table A2 includes incidents that resulted, or could have resulted, in a breach of an environmental regulation, as well as incidents that resulted in no regulatory breach but that merit inclusion on the basis of significant severity.

APPENDIX C

COMPANIES PROSECUTED BY THE NEW SOUTH WALES, SOUTH AUSTRALIAN OR VICTORIAN EPAS AND THE WESTERN AUSTRALIAN DEPARTMENT OF ENVIRONMENTAL PROTECTION FOR THE PERIOD 1997–2000

Pre-Operative Prosecutions

- Amcor Limited 24/4/1998—air pollution—Victorian EPA—good behaviour (without conviction)—court costs.
- Caltex refineries (was Ampol)—charge of breach of licence condition (*Pollution Control Act 1970*)—N.S.W. EPA 1997/8—fine $25,000 in the Land and Environment Court.

Operative Prosecutions

- BHP Steel (JLA) Pty Ltd—pollute waters (*Clean Waters Act 1970*)—N.S.W. EPA 1998/9—fine $25,000 in the Land and Environment Court.
- BHP Steel (JLA) Pty Ltd—charge of breach of licence condition (*Pollution Control Act 1970*)—N.S.W. EPA 1998/9—fine $4,000 in the Land and Environment Court.
- Capral Aluminium Ltd—charge of breach of licence condition (*Pollution Control Act 1970*)—N.S.W. EPA 1998/9—fine $40,000 in the Land and Environment Court—January 1997.
- Capral Aluminium Ltd—charge of breach of licence condition (*Pollution Control Act 1970*)—N.S.W. EPA 1998/9—fine $30,000 in the Land and Environment Court—March 1997.
- Capral Aluminium Ltd—charge of breach of licence condition (*Pollution Control Act 1970*)—N.S.W. EPA 1998/9—fine $30,000 in the Land and Environment Court—September 1997.
- BHP Steel (AIS) Pty Ltd—pollute waters (*Clean Waters Act 1970*)—N.S.W. EPA 1999/2000—fine $30,000 in the Land and Environment Court.
- BHP Steel (AIS) Pty Ltd—pollute waters (*Clean Waters Act 1970*)—N.S.W. EPA 1999/2000—fine $12,000 in the Land and Environment Court.
- BHP Steel (AIS) Pty Ltd—pollute waters (*Clean Waters Act 1970*)—N.S.W. EPA 1999/2000—fine $8,000 in the Land and Environment Court.
- BHP Steel (AIS) Pty Ltd—breach licence condition (*Pollution Control Act 1970*)—N.S.W. EPA 1999/2000—fine $1,000 Wollongong Local Court.
- BHP Steel (AIS) Pty Ltd—breach licence condition (*Pollution Control Act 1970*)—N.S.W. EPA 1999/2000—fine $14,000 in the Land and Environment Court.

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JILL HOOKS AND CHRIS VAN STADEN

The Corporatization and Commercialization of Local Body Entities: A Study of Reported Financial Performance

This research examines the financial performance of three entities over a fifteen-year period. The aim is to determine the influence of corporatization, commercialization and ownership form on the reported financial performance of the three entities. Underpinning this is the premise, derived from the literature, that financial performance and funding can be expected to change following corporatization and commercialization and will reflect the effects of the form of corporate ownership.

A comparison of four performance measures shows that the reported financial performance of the entities improved following corporatization and that their gearing changed. Although the entities were initially similar and faced the same regulatory changes, there were definite differences in the resulting financial performance and gearing between the three entities. In general, by the end of the study period the privatized company was the largest and the one with the highest gearing, the highest ROA and the highest profit margin, whereas the public (council-owned) company was the smallest and had the lowest profitability. The trust-owned company performed in between these two, but on average its performance was closer to that of the public company. The study concludes that corporatization, commercialization and ownership form influenced financial performance and the level of debt funding.

Key words: Corporatization; Commercialization; Deprival value; Performance; Rate of return.

The New Zealand electricity industry provides a unique opportunity to examine how entities responded to major restructuring. The restructuring sought to create a competitive environment for the generation and supply of electricity which would encourage efficiency and result in competitive electricity prices. Prior to these reforms the industry was almost completely owned and operated by central and local government in a non-competitive environment. In preparation for

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intended competition, all entities were required to corporatize[1] during the early 1990s and the government appointed interim directors for each entity to manage this transition.

This research examines the reported financial performance and funding of three entities over a fifteen-year period from 1988 to 2002.[2] The aims are, first, to determine the effects of corporatization, commercialization and competition on the reported financial results of the entities and, second, to distinguish the results of three entities in terms of ownership type. After corporatization various ownership forms resulted. The three entities chosen have different ownership forms: a private (listed) company, a local council-owned and therefore a public sector company, and a trust-owned company where the shares are held in trust for electricity consumers in a certain area. Our study is based on the premise that financial performance and funding can be expected to change following corporatization and will reflect some of the effects of the ownership form. A case study approach is used to provide insights into the effects of corporatization and different ownership forms on the reported financial performance and funding of the entities over a period of time.

We find that the reported financial performance of all the entities improved following corporatization and that their debt levels changed. Also, the three entities performed quite differently. Although similar in many respects at the outset, the privatized company was the largest at the end of the study and had the highest gearing, return on assets and profit margin. The local council-owned (public) company had the lowest level of debt and return on assets and the trust-held company's performance was between these two, but closer to that of the publicly owned company.

Our research makes a number of important contributions. Since utilities provide essential services such as distribution networks, transport and transmission, the efficiency of utilities impacts on the efficiency of other businesses (Pickford, 1996). The New Zealand electricity reforms are part of a world-wide move to deregulate and privatize utilities in order to improve their efficiency. This international trend has involved governments passing control of airlines, railways, telecommunications, water supply, airports and sea ports to the corporate sector. A comparative study of the financial performance of divested entities with different ownership is therefore of international interest. In addition, many of the entities in New Zealand remained in public ownership and only a few became privatized. Since the view that competition and deregulation are more important than privatization is expressed in the literature, the New Zealand phenomenon of introducing a competitive environment without necessarily changing to private ownership adds another dimension to the privatization debate.

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[1] For this article corporatization means the transforming of a former government department or unit into a corporation or company with commercial trading objectives and with directors initially appointed by government and later by shareholders. Corporatization does not imply privatization, as privatization involves the sale of the shares/assets to private owners. Only a few New Zealand electricity entities were privatized. Many of the entities, while operating in what was intended to be a competitive environment, remained in public ownership, that is, remained public sector companies.

[2] We conclude the study in 2002 when the listed company was taken over by another company. The trust-owned company listed 25 per cent of its shareholding on the NZX in 2005—75 per cent of the shares are still owned by the Electricity Consumers' Trust. As the NZX listing was three years after the end of the study period, it is expected that the strategies and objectives of the entity were not influenced during the study period by an intention to enter the capital market.

The study covers a period of fifteen years and therefore provides a different perspective from others that rely on a short period of time with observations concentrated immediately before and/or after privatization. The case study approach provides an in-depth analysis of the effects of corporatization and privatization on financial performance and funding, both intra- and inter-entity.[3] The analysis provides comparative research across firms and time periods and a broader understanding of the development of the corporate form within a political and economic setting.

Previous studies have generally examined the performance of specific entities pre- and post-privatization. The research here examines reported financial performance and funding as companies made the transition from municipal (local government) entities to companies (corporatization) with different resulting ownership types. We not only compare reported financial performance and funding under different ownership types over time, but also examine the change in these measures within each company as a result of corporatization. We therefore extend the general literature on accounting and financial performance within a developing environment of commercialization. Additional insights are provided as we include the financial performance of a trust-owned company which is a significantly different ownership form than the mixed enterprises (partially nationalized companies) previously examined.

INDUSTRY BACKGROUND

Reorganization of the New Zealand electricity industry began in the late 1980s and since then the industry has been radically reformed. The government's specific aims when deregulating the electricity sector were to ensure both pricing that reflected the true cost of electricity, and competition and choice for consumers (Macalister, 1997). This involved eliminating government (central and local) involvement in business activities in order to create a competitive environment in the generation and supply of electricity.

In 1987 electricity generation and transmission was corporatized by the establishment of the Electricity Corporation of New Zealand (ECNZ). Distribution (the transfer of electricity from grid supply points to consumers by means of a lines network) and retail (the wholesale purchase of electricity and its sale to consumers) were the responsibility of sixty-one electricity supply authorities (ESAs) consisting of local power boards and municipal electricity departments (MEDs), each with an exclusive franchise to supply electricity within its area. The power boards were managed by board members elected at triennial local body elections and the MEDs were controlled by local city or borough councils. These entities tended to be not-for-profit, with any surplus used to subsidize other community-based services.

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[3] The impact on financial performance and funding was used rather than the impact on share prices as the entities in our study did not have listed shares before corporatization and two of the three entities did not have listed shares after corporatization.

The ambit of the analysis covers entities responsible for the distribution and retailing (supply) of electricity. Reform of this sector of the electricity industry began with the removal of tax exempt status in April 1987. This was followed in 1990 by the removal of both the elected board members and the election process. Following this change in governance mechanism, government-appointed interim directors, mainly recruited from the private sector, were put in place. Their mandate was to improve commercial performance and prepare each entity for reorganization into a corporate structure. The *Energy Companies Act 1992* provided for the corporatization of ESAs and required each company 'to be a successful business' (s. 36). Share ownership plans, which took account of views expressed in local consultation, were developed. The resulting ownership structures were local councils, trusts and privatized companies.

Most ESAs chose to allocate the shares to a trust which then held the shares on behalf of consumers in the local area. Thus, the identity of the company was retained and consumers maintained an indirect interest in the outcome of the entity's performance. A small proportion (15 per cent) of the ESAs chose to vest their shares in local councils. These well-established ownership bodies concentrated on bringing commercial discipline to the trading arm of their activities but were not faced with ongoing pressures to satisfy the demands of capital markets. Only 10 per cent of the ESAs chose to be listed companies. Initial shareholdings were dominated by customers/electors in the previous franchise areas who were issued with free shares. Additional parties were introduced to the share register as 'cornerstone' shareholders—for example, other energy companies, either New Zealand or foreign domiciled—who were offered shares at a price determined by the directors (see Hooks, 2000).

The *Electricity Act 1992* provided for the removal, over time, of franchise areas. A competitive element was thus introduced into the retailing component of the industry and the old cost-plus pricing of the power board era was replaced by an emphasis on profitability. The new commercial focus, new ownership structures, new stakeholders and an emphasis on profits saw the demise of the old lines of accountability. In many countries, electricity distribution entities are subject to controls on earning capacity because they are deemed to be natural monopolies. Common forms of regulation include price regulation (U.K., Norway, Sweden, Denmark, Spain) or rate-of-return regulation (U.S.A., Finland). In New Zealand, control has been 'light-handed' and based on the disclosure of information as required by the Electricity (Information Disclosure) Regulations 1994 and 1999 using performance measures to provide yardstick monitoring backed by the provisions of the *Commerce Act 1986* which restricts anti-competitive behaviour or abuse of a dominant position and provides for the possibility of price control. These regulations required separation (in an accounting sense) of line business activities from potentially competitive retailing and generation activities, thus revealing any cross-subsidies from natural monopoly activities in favour of potentially competitive activities. A significant outcome of these regulations was the requirement to benchmark the value of the distribution networks (electricity lines). A valuation methodology known as Optimized Deprival Value (ODV)[4] was introduced. ODV was compulsory for performance measurement purposes but did not necessarily form part of the company's financial reporting.

Prior to deregulation of the electricity industry and corporatization of the integrated lines and retail companies, electricity entities competed for industrial and commercial customers but not for domestic consumers. The reforms aimed to remove barriers to competition in this area. Theoretically, the newly formed companies were able to compete for energy sales even though customers were initially on the networks of other providers. However, at June 1997 only 7 per cent of electricity had been traded outside the former franchise areas in the four years since deregulation (Macalister, 1997). In 1998, the Minister of Energy ordered the industry to introduce low cost switching so consumers could switch between power companies quickly and cheaply. The introduction of deemed profiling in April 1999 allowed retailers to determine the cost of electricity sold to customers based on average profiles of consumption and by April 2000 4.8 per cent of total customers switched supplier.

The government was increasingly concerned with the ability of the integrated electricity companies to cross-subsidize their distribution and retail business activities (subsidizing their competitive retail business from their lines business where they had the monopoly for an area). It was thought that such cross-subsidization was limiting the development of competition in the industry and in 1998 the *Electricity Reform Act* required the ESAs to split their distribution and retail businesses into two corporate bodies, each with its own management and board of directors. This was followed by a period of intense activity in the industry as companies moved to sell either their network business or their retail business. Most companies retained their network business activities. There were a significant number of mergers and acquisitions and at the end of this rationalization process there were thirty-three distribution companies compared to the previous sixty-one integrated entities. The retail businesses were, on the whole, purchased by state-owned generation companies thus establishing a new form of integrated company—the generator/retailer. Figure 1 shows the structure of the industry pre- and post-reform.

LITERATURE REVIEW AND THEORETICAL PERSPECTIVES

The influence of ownership on financial performance has been extensively studied in market economies.[5] Studies have often been based on the property rights theory

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[4] Optimized Deprival Value is the lesser of Optimized Depreciated Replacement Cost or Economic Value on a discounted cash flow basis (such being the greater of value in use or disposal value). It stems from the premise that the value of an asset to an entity is the amount that the entity would lose if deprived of that asset. It was introduced to ensure a standard method of valuation for network assets. Two articles in this journal (Walker *et al.*, 2000; Johnstone, 2003) have discussed ODV.

[5] See Shleifer and Vishny (1997) and Shirley and Walsh (2001) for a survey of this literature.

FIGURE 1

INDUSTRY STRUCTURE

Pre-reform	Post-reform
Generator	Generators/retailers
↓	↓
National grid	National grid
↓	↓
Integrated power boards	Lines companies
↓	↓
Consumers	Consumers

of the firm, which suggests that public sector enterprises can be expected to perform less efficiently and less profitably than private-sector enterprises. Property rights theory emphasizes the importance of being unable to sell the ownership share in a public-sector entity with the resulting consequence that individual risk is reduced and greater dependence is placed on state provision. Property rights theory therefore suggests that it is desirable to convert public-sector corporations into private ownership, particularly when the ownership is not concentrated. Two types of studies have generally resulted: those that examine the impact of privatization on the financial performance of the entities and those that study the impact of ownership concentration.

Much of the empirical work about the impact of ownership has focused on public versus private ownership—whether private-sector firms perform better than those that are government-owned and whether privatization improves firm performance. The literature generally finds that private-sector firms perform better than government-owned firms. For example, Boardman and Vining (1989) compared the performance of entities in both competitive and regulated environments. They found some evidence that privately owned firms are significantly more profitable than state-owned and mixed (state and private) ownership enterprises. De Alessi (1974), Bennett and Johnson (1979), Vining and Boardman (1992), Megginson *et al.* (1994) and Reeves and Ryan (1998) have also found that private firms are significantly more profitable and efficient than government-owned firms. Dewenter and Malatesta (1997) found that private firms are significantly more profitable and have significantly less debt. Bradbury (1999) found that government ownership removes essential economic managerial incentives such as competition, financial analysts, share and debt markets, which potentially impairs performance. Megginson and Netter (2001) surveyed the literature on privatization[6] and found strong support for the proposition that privatization improves operating and financial performance. Almost all of the studies report significant increases in profitability (efficiency) and significant declines in leverage as a result of privatization (Dewenter and Malatesta, 1997; Boubakri and Cosset, 1998; D'Souza and Megginson, 1999).[7]

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[6] Megginson and Netter (2001) evaluate the results of thirty-eight studies that employ accounting and/or related output data to examine the impact of privatization on operating efficiency, ownership structure and/or financial performance.

Some of the research that examines ownership concentration has considered the influence of institutional investors on performance (e.g., McConnell and Servaes, 1990; Shleifer and Vishny, 1997). Others have assessed the effects on profitability of dispersed ownership compared to concentrated ownership (Claessens *et al.*, 1997; Aghion and Tirole, 1997; Bolton and von-Thadden, 1998; Kocenda and Svejnar, 2002). The findings have been mixed. Claessens *et al.* (1997), Shleifer and Vishney (1997) and McConnell and Servaes (1990) reported a positive relationship between more concentrated or institutional ownership (e.g., bank sponsored funds) and a firm's profitability. Conversely, Aghion and Tirole (1997) and Kocenda and Svejnar (2002) found that dispersed ownership has a higher positive effect on profits than more concentrated ownership of any kind and Bolton and von-Thadden (1998) found that ownership dispersion may be optimal in specific circumstances.

Since one of the entities in our case study was privatized and listed on the New Zealand Stock Exchange (NZX), the privatization literature informs our expectations with regard to this company. In addition, ownership was concentrated in one key shareholder, which makes the literature on ownership concentration also useful. However, our study adds a further dimension because although all of the entities were corporatized only one was privatized in the true meaning of the term. Property rights theory will therefore not be applicable to the trust-owned and council-owned entities as they simply hold the shares on behalf of the community/consumers, so the process of selling their ownership will be a lengthy one, requiring extensive consultation with various parties.

Lapsley (1993) proposes that the theory of contestable markets has had a dramatic effect on the public sector. He uses this theory to suggest that economic efficiency is achieved by opening up markets for public services to potential entrants and that the threat of new entrants therefore ensures efficiency. Since one of our entities remains in public ownership, studying its performance after the New Zealand electricity industry was commercialized provides an indication of whether the threat of competition improved the financial performance of this company. Megginson and Netter (2001) note that there are those that argue 'that competition and deregulation are more important than privatization or governance changes in improving performance of firms' (p. 337). By comparing and contrasting the performance of the privatized company with that of the public-owned company in the same industry (and using companies that were essentially similar at the outset), we can further contribute to this debate. This is an area that has not been widely researched. Megginson and Netter report only three studies—one on Poland and two on China—involving transitionary economies. However, our study reports on the changes that occur when an industry within a market economy is exposed to competition and market forces (albeit of a limited nature). The New Zealand experience is also different from the U.K. experience reported by Thomson (1993), where the deregulation of the industry and the privatization of the entities happened at the same time.

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[7] There have been studies that found no significant difference between public and private ownership performance (Millward and Parker, 1983; Borrins and Boothman, 1985; and Fare *et al.*, 1985) and some that found little indication that ownership form influences performance (Caves and Christensen, 1980). Also, the findings of Martin and Parker (1995) are less conclusive; improved performance after privatization was found in fewer than half the firm measures they studied. However, since the Megginson and Netter (2001) study is a comprehensive one and strongly concludes that 'privatization appears to improve performance measured in many different ways, in many different countries' (p. 347), we accept their view in this regard.

In the New Zealand environment many of the resulting companies became trust-owned, with the trust holding the shares on behalf of the electricity consumers in a certain area. Since this ownership form has not been the subject of previous research, a trust-owned company was included here to determine if it would behave more like the privatized company or the publicly owned one.

Thomson (1993) framed her U.K. electricity industry study within agency theory, which assumes that managers have incentives to behave opportunistically, and found evidence of 'big bath' accounting. This method of earnings management is likely to be present in our study as the newly appointed managers had incentives to ensure that profits increased as a result of their governance. Attempts to solve this assumed problem include the *Energy Companies Act 1992*, which required entities managed by 'approved persons' (government-appointed directors) to produce a Statement of Corporate Intent which includes objectives and performance targets. Opportunistic behaviour is also controlled to some extent by s. 211 of the *Companies Act 1993* which requires annual report disclosures to include a description of changes in accounting policies during the period.

All the companies studied were initially involved in the competitive environment created by the reforms in the industry—through mergers and acquisitions of other integrated distribution (lines) and retail companies. This rationalization process, occurring between 1992 and 1998, was followed by the regulatory requirement for distribution and retail businesses to split in order to increase competition in the retail sector. The companies examined chose to retain their lines businesses, which resulted in natural monopolies owning electricity lines networks without any real threat of competitors installing parallel infrastructures. Lapsley (1993) indicates that 'a major consequence of the implementation of the property rights approach is the creation of private monopoly, with the challenge of devising regulatory systems to protect customers' (p. 71).

Regulation of the industry in the period studied was light-handed and involved the monitoring of accounting return on investment (ROI) for each company. By 1999 the regulatory regime applied only to monopoly lines companies and included provision for the government to impose price controls if there was evidence of excessive profits being earned. Retail companies were considered to be competitive and did not operate with this regulatory risk.

Political cost theory (Watts and Zimmerman, 1978) predicts that managers of firms that are concerned about political action resulting in further regulation will have an incentive to choose accounting methods or applications that will reduce reported income and returns. In New Zealand the electricity companies reported to the government using the ODV methodology and this report appeared to be used to ensure that profits did not exceed the government's estimate of a fair return (determined by a comparison of ROI with after-tax weighted average cost of capital). Interestingly, the companies do not have to use the ODV valuations in their financial reports. The fact that all three of the companies in our study eventually revalued their assets for financial reporting purposes can be explained by a desire (a) to increase their assets (and equity) to justify higher loans and (b) to justify their profits to other stakeholders as being fair and therefore not worthwhile investigating with a view to further regulation. For example, Emanuel (1984) suggests that companies may revalue assets in order to report a lower rate of return than would otherwise be the case, in order to produce evidence of 'poor' performance. This is in line with political cost theory, as lower returns on revalued assets can indicate that the company's profits are not excessive and may prevent pressure from consumer groups for further regulation in the form of price control. However, political cost theory is not strongly supported in our case study as the other accounting policy choices we observed increased reported profits and returns. The need for increased borrowing[8] could be a more important reason for revaluing assets, rather than preventing political costs in the form of further regulation.

To summarize, using a case study approach for similar companies allows us to comment on the difference in financial performance between a privatized and public company in the same industry and also allows us to observe the change in financial performance when an industry becomes commercialized. In addition, we observe the performance of a fairly unknown ownership form, the trust-owned company.

METHOD

Our aims are achieved by tracing the financial impact of the electricity industry reforms on the three largest electricity utilities in terms of total assets and customer numbers: Waitemata Electric Power Board (WEPB), Auckland Electric Power Board (AEPB) and Christchurch Municipal Electricity Department (CMED). These entities have been chosen because they were initially all similar in size and, although they were all corporatized at about the same time, the resulting form of corporate ownership is different for each entity—a fully privatized entity, one in which shares are held by a trust on behalf of the community, and a local government-controlled entity. WEPB (renamed UnitedNetworks Ltd) became the largest of the New Zealand listed electricity distribution companies, AEPB (renamed Vector) became the largest of the trust-owned electricity distribution companies and CMED (renamed Orion) became the largest of the council-owned electricity distribution companies. The data were obtained from the 1988–2002 corporate annual reports of the three entities. A valid comparison is possible because the three companies examined followed broadly the same accounting policies.

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[8] This is discussed further in the Debt to Equity section.

This approach is suitable for research which is descriptive and interpretive. A case study enabled us to examine three organizations, each with a number of different characteristics, to describe the general relationships between events and reported financial performance and to interview relevant accountants to enrich our understanding and interpretation. It is a favoured approach when 'how' and 'why' questions are involved (Yin, 2003). In our case the questions are: how did the performance differ inter- and intra-company, pre- and post-corporatization, and why were there differences?

The analysis begins in 1988, one year after the commencement of the electricity industry reforms and a few years before the sampled entities were corporatized. We use two periods (before and after corporatization), examining the trends for four performance measures, calculated from reported financial results, over the fifteen-year period. The measures are return on assets, return on equity, debt to equity and net profit margin. Similar measures have been used in other studies that utilize accounting ratios to examine financial performance (Boardman and Vining, 1989; Karpoff and Rice, 1989; Spicer *et al.*, 1996; Bradbury, 1999).

ENTITY BACKGROUND

This section briefly highlights the changes that occurred in each entity over the fifteen-year period. The entities became corporatized during the period of the study and changed their names several times. Figure 2 shows the changes.

For the purposes of this study the entities will be referred to in the following way: privatized company—WEPB/UNL; council-owned company—CMED/Orion; and trust-owned company—AEPB/Vector.

FIGURE 2

ENTITIES IN THIS STUDY AND THEIR NAME CHANGES

WEPB/UNL (privatized company)
  Waitemata Electric Power Board
  Waitemata Electricity (1992)
  Power New Zealand Ltd (1994)
  UnitedNetworks Ltd (1999)

CMED/Orion (council-owned company)
  Christchurch Municipal Electricity Department
  Southpower (1990)
  Southpower Ltd (1993)
  Orion New Zealand Ltd (1999)

AEPB/Vector (trust-owned company)
  Auckland Electric Power Board
  Mercury Energy Ltd (1993)
  Vector Ltd (1999)

Waitemata Electric Power Board/United Networks Ltd (Privatized Company)
Waitemata Electric Power Board commenced business in 1925 as a local body entity managed by a board of elected members. The entity continued in this form until the *Energy Companies Act 1992* required it to be corporatized. WEPB changed its name to Waitemata Electricity. In July 1994 it merged with Thames Valley Power Board and changed its name to Power New Zealand Ltd. The company was privatized in early 1995 and listed on the New Zealand Stock Exchange. Free shares were issued to customers in the previous franchise area. Other shares were purchased by Utilicorp New Zealand Ltd as the cornerstone shareholder. As rationalization of the industry progressed, the company invested in other electricity companies. Following the passing of the *Electricity Reform Act 1998*, the company divested its retail business, retained its lines network business, and purchased other network companies. The company, renamed UnitedNetworks Ltd, became New Zealand's largest network business providing services to approximately 30 per cent of the country's electricity consumers. Majority ownership (74 per cent) was held by a U.S.-based utility company, Utilicorp.

Christchurch Municipal Electricity Department/Orion Ltd (Council-Owned)
Christchurch Municipal Electricity Department (CMED) was owned by the local city council and supplied power to customers residing in the city of Christchurch. On 1 February 1989 the assets and liabilities of CMED and the Central Canterbury Electric Power Board (CCEPB) were transferred into joint venture ownership. The joint venture was named Southpower with CMED having a 72.5 per cent share and CCEPB 27.5 per cent. After the passing of the *Energy Companies Act 1992*, the joint venture became a company on 30 April 1993 with the shares vested in the three local authorities of the area: Christchurch City Council (87.6 per cent), Selwyn District Council (10.7 per cent) and Banks Peninsula District Council (1.7 per cent). The company continued to operate as an integrated generation, retail and distribution company until the end of 1998 when, following the requirements of the *Electricity Reform Act*, it sold the Southpower name and retail business to TransAlta (a Canadian company) and kept its network business which was 100 per cent council owned. The company name was changed to Orion New Zealand Ltd and a gas network was purchased. By 2002 Orion had sold all of the gas business and focused on its core business of being an electricity network company serving the central South Island region.

Auckland Electric Power Board/Vector Ltd (Trust-Owned)
Auckland Electric Power Board was a local body entity, managed by elected board members. It supplied electricity to domestic, commercial and industrial customers in and around Auckland city. During 1991/92 the entity was reorganized by adopting a new structure and executive team. The entity became a company, Mercury Energy Ltd, on 1 October 1993. All the shares were issued to the Auckland Energy Consumer Trust (AECT), which is governed by its own trust deed and holds the shares on behalf of Mercury Energy's customers. AECT appoints the board of directors and trustees are elected by consumers every three years. During

the rationalization phase, in which small entities were acquired by or merged with larger companies (the number of electricity companies was reduced from 62 to 33),[9] Mercury Energy unsuccessfully attempted to purchase other electricity companies and gas networks. In 1998 a massive breakdown in electricity supply to the Auckland central business district had a significant impact on the company's results. Following the *Electricity Reform Act 1998*, the company sold its retail and generation business and kept the network business. It changed its name to Vector Limited and concentrated on re-establishing its profitability.

RESULTS

Return on Assets (ROA) and Return on Equity (ROE)[10]

In terms of the literature review and contestable markets theory, we expected the entities to perform better after corporatization than before. It was also expected that the financial performance of WEPB/UNL would increase following privatization in terms of property rights theory and the extensive literature in this regard. And that the privatized company would be more focused on the commercial disciplines imposed by the market and to have more incentive to report better performance than the other two companies. With an overriding concern for creating wealth for shareholders ('improving the rate of return to shareholders ... is a key objective in the years ahead': Annual Report Power New Zealand Ltd, 1998, p. 7) the achievement of profits was important in maintaining the company's share price in the market and in its ability to raise funds in the future. We expected the public (council-owned) company to face less market discipline in terms of property rights theory since their shares were not traded on a market. As the company still had close ties with the community with its expectations of affordable electricity, we expected a less aggressive approach. The trust-owned company holds the shares in trust for the local consumers. Since this ownership form has not been studied before there were no specific expectations, although the literature and underlying theories provide a general expectation that this company form will perform more like the council-owned company since it faces similar property rights issues.

Table 1 compares the results for each company. Although in 1988 AEPB/Vector was the largest entity in terms of total assets compared to the other two entities, by 1998 the companies were of similar size in terms of total assets. WEPB/UNL had a strategic goal to become the largest network company in New Zealand and purchased other network businesses in order to achieve this. On the other hand, CMED/Orion chose to return capital to its shareholders after the sale of parts of its business ($650m returned over the study period). All three companies revalued

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[9] For example, The Lines Co. was formed from a merger of Waitomo Energy Services Consumer Trust and King Country Electric Power Trust; Wairarapa Electricity Ltd sold its business to Powerco and Genesis Energy (see Hooks, 2000).

[10] ROA was calculated as Net Profit Before Interest and Tax/Average Total Assets and ROE was calculated as Net Profit After Tax/Average Equity in accordance with White *et al.* (2003).

TABLE 1

RETURN ON ASSETS AND RETURN ON EQUITY

	Privatized (listed) WEPB/UNL	Trust-owned AEPB/Vector	Council-owned (public) CMED/Orion
Total assets			
1988	$143m	$339m	$116m
1998	$923m	$996m	$983m
2001	$2.276b	$1.009b	$683m
2002	$1.912b	$1.011b	$511m
Average total assets			
Pre-corporatization	$163m	$376m	$171m
Post-corporatization	$1,385m	$863m	$866m
Revaluations	$353m	$463m	$334m
Average ROA[a]			
Pre-corporatization	6.3%	7.0%	7.4%
Post-corporatization	11.9%	9.7%	8.3%
Average ROE[a]			
Pre-corporatization	4.0%	3.2%	4.4%
Post-corporatization	11.5%	8.1%	6.5%

[a] Excluding the effect of the sale of assets.

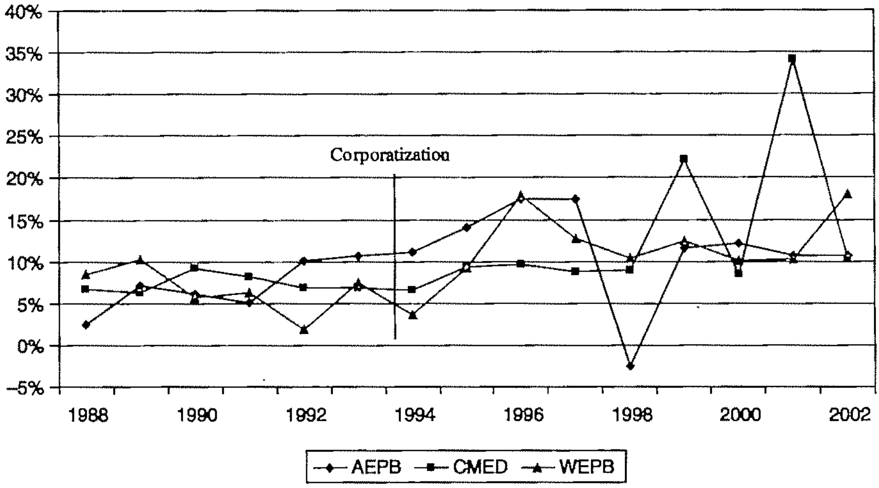
their assets upwards at least once (CMED/Orion by $334m over the 1992–97 period using net current value initially and then ODV in 1997, AEPB/Vector by $463m in 1999 using ODV and WEPB/UNL by $353m from 1995 to 1997 using ODV in 1997) and this influenced their rate of return both in respect of higher asset values and increased depreciation costs.

The trust-owned company (AEPB/Vector) had a more aggressive approach to restructuring than that of council-owned CMED/Orion. The profit orientation of AEPB/Vector placed emphasis on a reduction in staff and non-core activities were contracted out; for example, in 1992 employees numbered 1,141 and in 1998 (prior to the sale of the retail business) they numbered 574. In contrast, in 1992 the council-owned company had 663 employees and 920 employees in 1998. The increasing ROA of the trust-owned company (until 1997) reflects these cost-cutting measures as well as increasing sales of electricity.

Each company has taken a different approach to mergers and acquisitions. The council-owned company initially combined with some of the small power boards in its region, then invested in a large gas company. The trust-owned company (AEPB/Vector) concentrated on acquiring WEPB/UNL but was eventually forced to withdraw from this bid. On the other hand, WEPB/UNL benefited from the synergies of a merger with another large electricity company soon after corporatization

FIGURE 3

RETURN ON ASSETS



(net profit after tax increased 260 per cent from 1995 to 1996) and then went on to acquire shares in a number of other electricity companies and to purchase the network businesses of two large companies.

Excluding any gains from the sale of assets, all three companies increased ROA and ROE post-corporatization compared to pre-corporatization. The privatized company had the lowest pre-corporatization average ROA of 6.3 per cent and the greatest increase in average ROA post-corporatization to 11.9 per cent, which was also the highest post-corporatization average ROA. By contrast, the council-owned company had a higher pre-corporatization average ROA than the privatized company (7.4 per cent) but only achieved 8.3 per cent post-corporatization. This finding is in line with our expectations that the privatized company would have a greater focus on serving the financial interests of shareholders.

Figure 3 shows the return on assets for each company, including gains on the sale of assets.

The profit on the sale of WEPB/UNL's retail business (1999) is offset by an increase in assets from the purchase of two other networks. AEPB/Vector sold its retail business at a loss (1999) due to losses on hedged electricity contracts, but this loss was offset by the sale of its shares in WEPB/UNL and CMED/Orion has two distinct peaks reflecting the gain on sale of its retail business and later the gain on sale of its gas network. (Our comments are restricted to general trends in the calculated ratios—excluding sale of assets.)

The study identified two instances in which the companies created provisions for possible future losses and wrote down assets. This reduced the current year's reported income and provided an opportunity for an increase in income to be reported in subsequent years. Thomson (1993) posits that managers have an incentive to get rid of 'bad news' immediately before privatization to ensure higher profits and growth from a low profit base and DeAngelo *et al.* (1994) note that CEOs may 'take a bath' so as to increase the probability of future earnings. The newly formed WEPB/UNL exhibited this behaviour in the year before corporatization: 'We chose to bite the bullet in the 1991/92 financial year and clean out the Augean stables in compiling the annual accounts' (Annual Report Waitemata Electricity Ltd, 1992, p. 3). AEPB/Vector had a year when the company was experiencing poor financial results due to the ongoing failure to supply electricity to the CBD. The company took steps to provide for future contingencies, such as compensation claims in order to provide a basis for improved results in the following year when excess provisions of $17m were reversed. These earnings management activities provide evidence of agency theory in respect of opportunistic behaviour by managers who may have used the big bath in order to take credit for the improved results in the following year.

As the competitive environment developed and commercialization became a focus, all three companies made post-corporatization accounting policy changes that resulted in increased reported profits. The most significant of these were: treating capital contributions from developers as income rather than capitalizing them; using the partial method of accounting for deferred tax; and extending the usual write-off period for intangible assets. Capital contributions were previously deducted from the cost of assets to which they relate. By treating as income what is effectively a reimbursement, the asset remains in the accounts at above cost. The entity would then seek to obtain a return on that increased value. A WEPB/UNL accountant confirmed that these accounting policy changes were the result of an emphasis on increasing reported profits and that management was focused on their goal to float the company and wanted the business to look as profitable as possible (Hooks and Perera, 2006). We therefore found evidence that the change in the culture of the organization from providing an acceptable service at reasonable cost to a commercial/market orientation led to earnings management.

The regulatory regime required network assets to be revalued for governmental monitoring purposes using ODV methodology.[11] This was to ensure that all valuations were on the same basis in order to set benchmark rates of return. Taking these revaluations into the financial statements provided an opportunity for the companies to recognize a more accurate value for their network assets and increase the asset base for borrowing purposes. Aitken and Loftus (1994) state that managers select equity increasing strategies (e.g., asset revaluations) when firms approach their debt constraints. It was also commonly perceived that the resulting lower returns on assets were a means of justifying increases in electricity prices (Matthes, 1996) as companies focused on earning a commercial rate of return on those increased asset values (Macfie, 1998). In addition, Macfie reports that integrated electricity companies arbitrarily extended the life of their network assets, thus effectively inflating their value. In 1997, Merchant Bank BZW New Zealand reported that the easiest way for power companies to increase their earnings potential was to revalue their network assets upwards, thus exploiting the breadth of the government's valuation guidelines (Fallow, 1997) and providing a large windfall gain to network owners at the expense of consumers (Bertram and Terry, 2000).

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[11] ODV was for regulatory reporting purposes and these values were not included in the financial statements until some years after the first ODV reports to the Ministry of Economic Development.

Electricity prices did in fact increase for domestic users—from 9.71c per kWh in 1991 to 10.5 cents per kWh (in real terms) in 1998 (Bradford, 1998) and to 12.9 cents per kWh in 2002. This represents an increase of 33 per cent for this group. Macalister (1997) confirms that electricity prices for domestic customers and small users rose more than 30 per cent from 1992 to 1997 compared to an 11.5 per cent increase in the consumers' price index over that period. On the other hand, prices for commercial and industrial consumers decreased over the period (40 per cent and 15 per cent respectively in real terms). Prior to corporatization, domestic customers had significant influence via the election of the governing boards of the local council entities and demanded low prices. Commercial and industrial customers accepted higher prices as there was no alternative. Post-corporatization, domestic customers (87 per cent of all users) lost control over the election of boards and directors. Electricity companies chose to reduce prices for commercial and industrial users, who represent 65 per cent of total electricity consumption (Ministry of Economic Development, 2003). Although the removal of historic cross-subsidization between domestic and commercial users was a key reason for an increase in domestic prices, the combination of increased domestic prices and continuing lack of evidence of effective competition in the domestic retail market indicated monopoly pricing by the electricity companies (Macfie, 1998).

Debt to Equity

The literature indicates that the entities should have less debt after privatization than before. We found that for all the companies, debt levels increased after corporatization. The restructuring of the industry resulted in increased demands for cash to finance mergers and acquisitions. For example, in 1999 WEPB/UNL substantially increased debt to finance the purchase of the network assets of TransAlta ($590m) and TrustPower ($485m). Debt financing rose from $195m in 1998 to $1.125 billion in 1999. Table 2 provides a comparison of our findings.

The council-owned company's debt to equity ratio had a low of 4.56 per cent (2001) and a high of 95.68 per cent (1995). The more conservative approach adopted by the public company is evidenced by its considerably lower debt levels. This compares with peak debt to equity ratios of 180 per cent and 181 per cent for the privatized and trust-held companies respectively. These are the ratios reported in the financial statements and reflect the different timing of asset revaluations. If we consider the impact of asset revaluation on these ratios then the council-owned company's peak level of borrowing was $451m with equity of $556m (81 per cent). This compares with the privatized company's borrowings of $1.454 billion with equity of $806m (180 per cent), and the trust-owned company of $642m with equity of $817m (79 per cent). Taking into account revaluations,

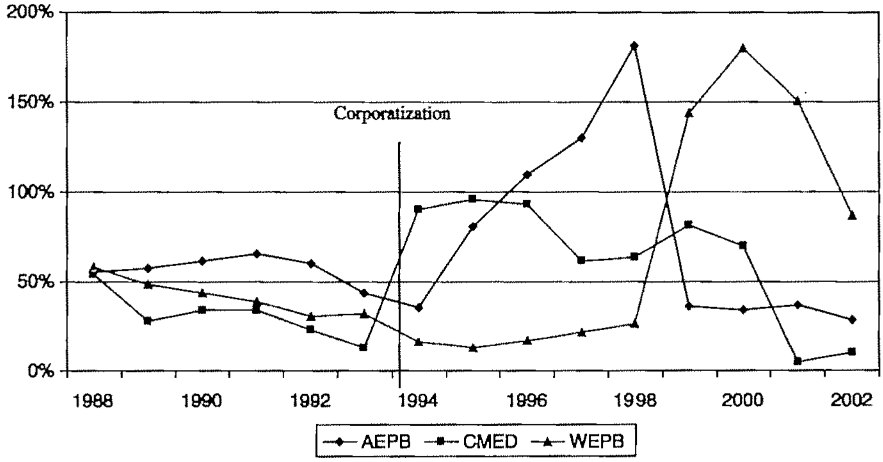
TABLE 2

DEBT TO EQUITY

		Privatized (listed) WEPB/UNL	Trust-owned AEPB/Vector	Council-owned (public) CMED/Orion
Impact on debt		Acquired 2 large companies Sold retail business	CBD crisis Sold retail business	Acquired gas business Sold retail business and gas business
Debt to equity				
1988		58.14%	55.66%	53.92%
1998		26.96%	181.27%	63.96%
2002		87.07%	28.44%	10.31%
Average debt/equity				
Pre-corporatization		38.50%	57.51%	31.08%
Post-corporatization		80.16%	74.92%	63.44%
Range of debt to equity	L	12.67% (1995)	28.44% (2002)	4.56% (2001)
	H	180.40% (2000)	181.27% (1998)	95.68% (1995)

FIGURE 4

DEBT TO EQUITY



there is little difference between the public company and the trust-owned company as far as funding levels. In all cases, debt increased post-corporatization.

Figure 4 and Table 2 show that post-corporatization debt levels increased significantly for the privatized and trust-owned companies and increased moderately for the council-owned company. Prior to the reforms, money was set aside from income to finance special projects and the entities generally had little debt. Post-corporatization, the trust-held company did not acquire other networks but nevertheless the debt to equity ratio continued to increase to finance a CBD tunnel initiative (carrying cables from a suburb to the city) and new power stations. The trust-owned company also borrowed heavily to finance the CBD crisis (reaching a peak in 1998) and the listed company borrowed to purchase other networks (particularly in 1999 and 2000 when they purchased two large networks). However, Figure 4 shows that peak levels were short-term and that by the end of the study period debt to equity had been substantially reduced—in the case of two of the companies, to below pre-corporatization levels.

Our finding that debt increased following corporatization is contrary to the findings in the literature in which almost all of the studies report significant declines in leverage post-privatization. We posit that the difference is due to the nature of the New Zealand electricity industry over the period examined. Following corporatization the electricity companies began to merge or take over other smaller electricity companies. The debt financing needed for this purpose addresses an instruction from government to address 'the lazy balance sheets' (discussion with WEPB/UNL accountant). In particular, increased debt levels were due to the effects of the *Electricity Reform Act 1998* which required companies to divest either their retail or their lines business. This provided opportunities for large investments and therefore increased borrowings. Also, the companies examined here were probably regarded as low risk by banks since they all owned their own network and therefore had a valuable asset and an almost guaranteed future income stream. We are also of the opinion that the companies eventually revalued their assets on the balance sheet in order to report more reasonable debt to asset ratios to justify further borrowings.

Net Profit Margin (NPAT/Revenue)

As already discussed in the ROA/ROE section, above, entities were expected to perform better after corporatization than before corporatization. The focus on improving the efficiency of the industry would most likely lead to a greater emphasis on profits and earnings per share as indicators of performance. In terms of property rights theory we expected that the privatized company would be more focused on the commercial disciplines imposed by the market and would therefore aim for higher profit margins than the other companies in our study. Table 3 compares the findings for these entities. These figures ignore inflated profits from asset sales and clearly indicate the higher profitability of the privatized company.

Corporatization and commercialization had a stimulating effect on the financial performance of all three entities. The privatized company's net profit margin increased from 2 per cent to 9 per cent from 1994 to 1995 and then to 20 per cent in the following year—the year of privatization. By 2001 the net profit margin was 26.5 per cent. Profits also increased for the council-owned and trust-owned companies. Arguably, the more conservative average net profit margin of the council-owned company reflects the ownership form. The findings are in line with our

TABLE 3

NET PROFIT MARGIN

	Privatized (listed) WEPB/UNL	Trust-owned AEPB/Vector	Council-owned (public) CMED/Orion
Net profit margin			
1988	3.53%	–0.70%	2.48%
1998	15.97%	–8.01%	8.23%
2002	27.41%	25.44%	16.55%
Average net profit margin*			
Pre-corporatization	3.0%	2.1%	3.1%
Post-corporatization	18.2%	11.8%	8.4%
Net profit after tax (range)			
Pre-corporatization	\$4m to \$7m	(\$2m) to \$21m	\$3m to \$4.7m
Post-corporatization	\$17m to \$131m	(\$48m) to \$94m	\$12m to \$41m

* Excluding the effect of the sale of assets.

expectations and with the literature which suggests that changes in the objectives of entities from profit-satisficing to commercialization result in increased profitability. In addition, the finding that the privatized company was the most profitable is also supported in the literature. WEPB/UNL used a 'vocabulary of profit' (Craig and Amernic, 2004) in their post-privatization annual reports to stimulate efforts to become efficient and to give effect to their new privatized status (Hooks and Perera, 2006).

Figure 5 illustrates the net profit margin for each company and the increased (and fluctuating) profits post-corporatization.

The net profit margin of the privatized company does not follow ROA as the impact of asset revaluations on the net profit margin is less pronounced. The net profit margin of the private company shows a general upward trend, with some decline in 1997 with the first network revaluation and then a consistent upward trend after that. The peaks in the net profit margin of the council-owned company are explained by the sale of assets. For the trust-owned company, the net profit margin follows the drop in ROA caused by the 1998 CBD disaster and recovers after that to 25.4 per cent in 2002, slightly below that of the privatized company at 27.4 per cent.

Increases in profitability may be accompanied by declines in service. The electricity industry uses three standard measures—SAIDI, SAIFI and CAIDI—to measure the duration and frequency of interruptions of supply.[12] A study of these

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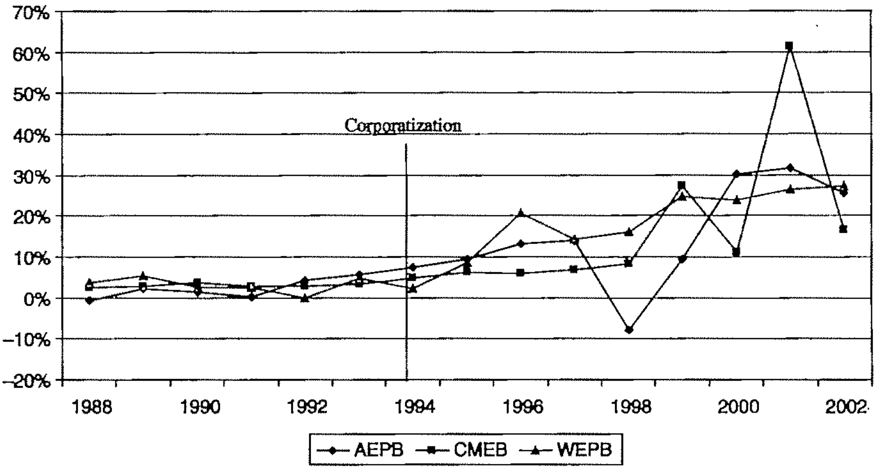
[12] SAIDI is the average total duration of interruptions of supply that a customer experiences in the year. SAIFI is the average number of interruptions that a customer experiences during the year and CAIDI is the average duration of an interruption of supply for customers who experience an interruption of supply.

Figure 5

NET PROFIT MARGIN



non-financial performance measures, submitted to the Ministry of Economic Development as part of the monitoring process, shows that there is no significant difference in the reliability of supply over the study period for WEPB/UNL and CMED/Orion. However, in 1998 as a result of the loss of electricity to the Auckland CBD, AEPB/Vector's SAIDI increased from an average of 123 minutes (1995–97 inclusive) to 153 minutes, and CAIDI from an average of 63 minutes (1995–97 inclusive) to 89 minutes. Vector was so focused on strategies to acquire a controlling interest in rival electricity company WEPB/UNL (then Power New Zealand), that it is alleged that it neglected the maintenance of its network infrastructure. The Commission of Inquiry into the event was critical of AEPB/Vector's risk management, operations and asset management practice (Ministry of Energy, 1998). It is therefore fair to conclude that, apart from this exceptional incident, increased profitability was not at the expense of reliability of service. Apart from this critical incident affecting the performance of the trust-held company, security of supply for the Auckland and South Island regions served by the case study companies was not compromised during the study period.[13]

CONCLUSION

This research has investigated three electricity entities in order to examine the effects of corporatization, commercialization and competition on the financial results of the entities, and also to distinguish the results of the three entities in terms of ownership type. In the absence of comparative share prices, we used accounting-based performance measures to assess financial performance. The comparison of four performance measures shows that, at the end of the study period, the council-owned (public) company was the smallest (in terms of total assets) of the three companies examined (although it was similar in size to the largest one at the outset). The council-owned company also returned the most capital to its shareholders and was the most conservatively financed of the three with only 10 per cent debt to equity at the end of 2002 compared to 28 per cent for the trust-owned company and 87 per cent for the privatized company. Companies that earn returns higher than the cost of debt can use debt to improve ROE, but higher debt to equity does not necessarily indicate better performance. Funding levels can be an indication of risk with higher debt to equity indicating higher risk. It is possible that the debt levels of the three companies are a reflection of how aggressively they were pursuing market share and growth. The council-owned company apparently did not have this desire and in fact returned capital to shareholders on several occasions. This contrasts with the listed company which borrowed heavily to finance the purchase of other lines companies.

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[13] Security of supply was a focus in 1998 following the CBD crisis. It was only after the conclusion of our study (i.e., 2005–06) that the reliability of the Auckland network has again been questioned.

At the end the period under examination the privatized company was the largest and the one with the highest debt to equity ratio, the highest ROA and the highest profit margin. Although average net profit margin prior to corporatization was almost the same for all three companies, the average net profit margin post-corporatization was significantly different: 8.4 per cent for the council-owned company, 11.8 per cent for the trust-owned company and 18.2 per cent for the privatized company.

Since a trust-owned company was included in the study, we could also observe the performance of this unresearched ownership type *vis-à-vis* the other two companies. On average, the financial performance of the trust-owned company was found to be more closely aligned to the council-owned (public) company than to the privatized company. The structure of the entity was not dissimilar to that of the council-owned entity in that shares were held on behalf of consumers and 'dividends' were issued in the form of rebates. Both companies were free from the pressure of meeting the financial demands of a major shareholder.

We observed an instance of new management taking a 'big bath' in order to benefit from discretionary accounting decisions which reduce current income. This practice did not have a significant effect on the general trends that we observed because we used averages over the period of the study. Also, most of the accounting policy changes for all three companies led to increased profits, the notable exception being the policy change by all three to revalue network assets. It was felt this was motivated by the high level of borrowing that the companies had post-corporatization. On the whole, the three companies in the case study used the same accounting policies which made it possible to compare reported financial performance.

Previous research has compared the financial effects of public versus private ownership and raised the expectation that the privatized entities will perform better than public entities. Our study has added another dimension to this research by observing the financial performance of entities following the commercialization of a whole industry. In terms of the profitability measures analysed, all the companies, whether they were privatized or not, were found to have improved their reported financial performance after corporatization as they moved from local government entities to corporate entities facing a commercialized environment. It appears that commercialization and governance changes rather than privatization motivated the improvement in performance of the trust-owned and council-owned companies which partially supports Megginson and Netter (2001). The privatized company's reported profitability was higher than that of the council-owned (public) company. This is consistent with most of the extant literature and property rights theory and reflects the change in emphasis for the privatized company from earning a reasonable rate of return on a local body asset (the electricity network) to 'ensuring profitable growth for shareholders' (Annual Report Power New Zealand, 1995, p. 8). The case study results therefore show that, although commercialization and deregulation improved the financial performance of the three entities examined, privatization had the biggest impact.

Limitations

This research is limited to the reported financial performance of the three entities and we are aware of the limitation that financial performance is only one aspect of the overall performance of an organization. (We did report briefly on some service efficiency measures, but this is not the main focus here.) Our measures of ROE and ROA (and profit margin) are considered to measure the financial performance of organizations, particularly from the viewpoint of the shareholders/investors. So comparing these measures between companies and before and after corporatization gives us a clear indication of how the companies performed compared to one another and also between periods. Higher profitability and returns may not be best for all the stakeholders involved, but are of benefit to the shareholders and to the future of the company.

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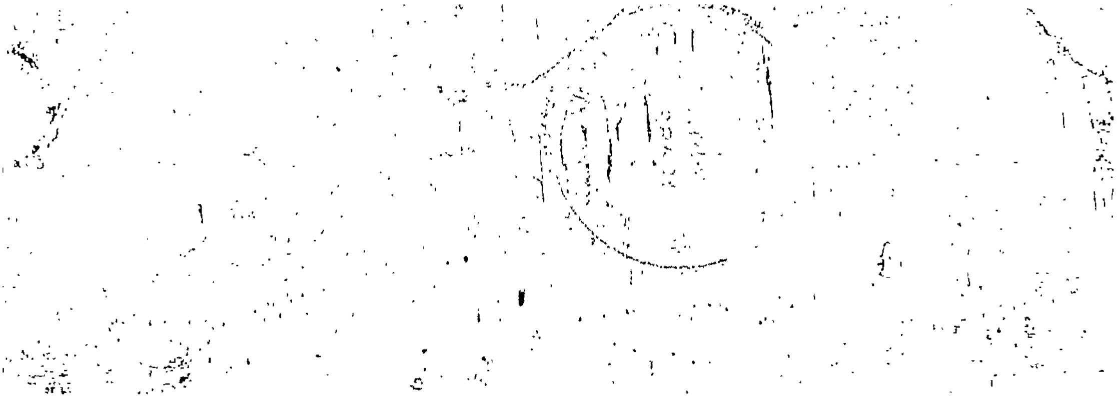

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Abacus

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REVISITING DISTRESS PREDICTION AND DEBT RECOVERY

FORUM EDITORIAL

A number of recent and planned forums and workshops provide evidence of renewed interest in distress prediction and default recovery research by both academics and practitioners. These include the forum held at The University of Sydney on 29 September 2006, Revisiting Distress Prediction and Debt Recovery—papers of which are reproduced in this issue—and the workshop to be held in Remmes, 13–14 September 2007, Default Risk and Financial Distress. This renewed interest is appositely described in Altman and Hotchkiss (2005):

> In looking back over the first two editions of *Corporate Financial Distress and Bankruptcy* (1983 and 1993), we note that on both occasions of their publication the incidence and importance of corporate bankruptcy in the United States had risen to even more prominence. The number of professionals dealing with the uniqueness of corporate death in this country was increasing so much that it could have perhaps been called a 'bankruptcy industry'. There is absolutely no question now in 2005 that we can call it an industry.
>
> The areas of professional interest that now concentrate on corporate distress and bankruptcy include bond and loan creditors of ailing companies, bankruptcy lawyers, forensic accountants, restructuring groups at investment banks, 'vulture' distressed investors, traditional and non-traditional investors (e.g., hedge funds) who make loans to firms that have already filed for bankruptcy (called debtor-in-possession [DIP] lending in the U.S. and Japan), turnaround management specialists, and several others, including those firms which see opportunities to acquire firms which otherwise might have been liquidated. Notwithstanding the current lull in bankruptcy activity, we expect this industry to regain its momentum and importance.

This special Forum issue of *Abacus* reproduces six papers and discussants' reports from the September 2006 Sydney University Forum, which was promoted as an opportunity to focus on empirical distress prediction research that explores contemporary issues in an international context. Increased theoretical and practical research in this area followed the spate of corporate scandals in the new millennium and the forum papers presented a range of topics of immediate interest related to: distress prediction in the private and public sectors, corporate debt default and recovery rates predictions, how best to turn around companies, and how to assess the likelihood of shareholders receiving returns from U.S. Chapter 11 bankruptcies.

To put the Forum in context, when discussing debt to equity ratios as a predictive tool Atuallah *et al.* (2007) observed that:

> Altman (1968) pioneered the use of bankruptcy prediction models using multivariate discriminant analysis. While in recent years logit analysis and neural networks have become the more predominant methods for predicting bankruptcy, in a recent survey

> article Bellovary *et al.* (2006, p. 1) note that discriminant analysis and neural networks are regarded as 'the most promising methods for bankruptcy prediction' in the literature.

Several of the Forum papers consider and contest some of the matters raised by Atuallah *et al.* Changing technology and analytical developments were canvassed, as was work redressing the lack of a theoretical model of failure. The Forum augmented the traditional distress prediction research areas, with researchers exploring a much broader set of research topics—including financial distress issues in the SME and public sectors.

The six papers and discussant presentations were delivered before approximately sixty practitioner and academic delegates, and the Forum concluded with a lively panel discussion involving presenters, discussants and attendees. Presenters and discussants liaised over several months, and the presenters' papers and discussants' reports were then revised. They were then reviewed, with matters proposed for consideration by the Editor and Forum Guest Editor and discussants producing a final, revised version.

Leading finance academic, Professor Ed Altman, of NYU's Leonard N. Stern School of Business introduced the Forum, reiterating what has been observed above, namely that this topic is of extreme importance. He noted that among other reasons for the current prominence of credit scoring models is the huge impact that the discussion of and preparation for Basel II has had. This critical banking regulation, which will require banks and other relevant financial institutions to hold specified amounts of capital due to expected and unexpected losses on credit assets, has motivated these institutions to develop, upgrade, test and maintain models to quantify the probability of default of every counterparty in their portfolios. Scoring models, properly calibrated to historical experience of both the banks themselves and/or to capital market experience, are now ubiquitous.

Following Altman's introductory remarks, Hensher and Jones' 'Forecasting Corporate Bankruptcy: Optimizing the Performance of the Mixed Logit Model' provides an illustration of the usefulness of advanced probability modelling which they have shown previously is relevant in the areas of predicting corporate bankruptcies, insolvencies and takeovers. They specifically consider the merits of mixed logit (or random parameter logit), arguing that it is the most general of these models and appears to have the greatest promise in terms of underlying behavioural realism, desirable econometric properties and overall predictive performance. Using a three-state failure model, they show that the unconditional triangular distribution for random parameters offers the best population-level predictive performance on a hold-out sample. Further, the optimal performance for a mixed logit model arises when a weighted exogenous sample maximum likelihood technique is applied in model estimation. Finally, they suggest an approach for testing the stability of mixed logit models by re-estimating a selected model using varying numbers of Halton intelligent draws. Their results have broad application to users seeking to apply more accurate and reliable forecasting methods to explain and predict sources of firm financial distress more accurately.

The main concern raised by the discussant, Kalotay, was a perceived lack of information about whether the superior population level performance of mixed logit specifications is reflective of superior classification performance at firm level. This would assist in debt pricing, credit loss provisioning, and capital allocation. Failure to address this aspect of model performance is a substantial limitation of the current study. Hensher and Jones address this issue in their final version. Further, Kalotay suggests that 'Interesting avenues for future research may include the evaluation of mixed logit in a context where market variables are unavailable, namely, the modelling of private firm exposures. This would be an especially important context for the form of "out of universe" evaluations suggested in Sobehart *et al.* (2000).'

Charitou *et al.*'s 'Earnings Behaviour of Financially Distressed Firms: The Role of Institutional Ownership' continues the empirical-based focus. Using a sample of 859 U.S. bankruptcy-filing firms over the period 1986–2004, it examines the earnings behaviour of managers during a company's distressed period by looking at sources of abnormal accruals prior to the bankruptcy-filing year. Results revealed that management turnover, qualified audit opinions and firm governance mechanisms affect the quality of earnings and the level of abnormal returns. Managers of highly distressed firms were found to have shifted earnings downwards prior to the bankruptcy filing. Evidence obtained supports two potential contributing factors. First, top-level management turnover among distressed firms leads new managers to adopt earnings bath choices during the distressed period. Second, qualified audit opinions exert pressure on managers to follow more conservative earnings behaviour during the distressed period. To the best of the authors' knowledge, this is the first study that attempts to examine whether institutional ownership relates to market reaction in conjunction with a top management turnover or a qualified audit opinion during the distressed period.

Discussing the paper at the Forum (and subsequently with Charitou *et al.*), Bradbury raised several issues, some of which are addressed in Charitou *et al.*'s final version. Some matters of concern persist, as noted in the discussant's conclusions: 'Trying to uncover an empirical regularity between accruals and financial distress [entails] a number of methodological choices, including the choice of the primary financial distress event and the need to control for other potential events that might impact accruals. Given our state of knowledge of the effect of auditing or management change on bankruptcy, it is not clear that we can use simple dummy variables to control for these events, while looking for more exotic effects, such as institutional ownership. A fundamental research issue is the partitioning of accruals into discretionary and nondiscretionary components . . . Untangling the effects of earnings manipulation, real decisions, and abnormal non-discretionary accrual on total accruals is a major barrier to interpreting the results.'

At a more fundamental level, Peat's 'Factors Affecting the Probability of Bankruptcy: A Managerial Decision Based Approach' addresses a critical issue in distress prediction research—how is bankruptcy/failure modelled. The lack of a theoretical model of failure has been a major deficiency for decades (see Foster, 1976; Altman, 1983, 1993, 2005). The discussant, Kenth Skogsvik, observed that:

'In principle, the chosen methodology holds promise for the derivation of something as unique as a theory-based probabilistic bankruptcy prediction model'. Peat's managerial-based model differs from the majority of classification models which have used a pool of financial ratios combined with statistical variable selection techniques to maximize the accuracy of the classifier constructed. Some of this work has been described pejoratively as 'kitchen-sink theorising' (Foster, 1976). Others have been happy to accept that if it predicts, then let's stick with it until a theory of failure does emerge. Peat, however, provides an explicit economic theory for the selection of variables for inclusion in bankruptcy models. Variables which occur in bankruptcy probability expressions derived from the solution of a stochastic optimising model of firm behaviour are 'proxied' by variables constructed from financial statement data. The random nature of the lifetime of a single firm provides the rationale for the use of duration or hazard-based statistical methods in the validation of the derived bankruptcy probability expressions. Results of the validation exercise confirm that the majority of variables included in the empirical hazard formulation behave in a way that is consistent with the model of the firm. The results highlight the need for developments in the measurement of earnings dispersion.

Skogsvik's discussion of the paper at the Forum raised many issues, several of which are addressed in the final version. Some issues remain. Skogsvik notes that the approach is plagued by several non-trivial simplifications and difficult assessments, making it hard to determine whether the theory-based model is sufficiently robust to be helpful in empirical research. He states that the empirical results include some novel observations. A negative statistical association between company dividends and bankruptcy risk is observed, a result that has not received much attention in previous empirical research. The statistical association between the earnings expectation variable and bankruptcy risk is also interesting, even though the positive coefficient is not warranted by the theory-based model. But Skogsvik is concerned that Peat does not report any prediction results in the article, a deficiency that makes it hard to assess the forecasting quality of the proposed model.

Attention then switches to two papers addressing applied problems in the private sector—Altman and Sabato's 'Modelling Credit Risk for SMEs: Evidence from the US Market' and Wong *et al.*'s 'Surviving Chapter 11 Bankruptcies: Duration and Payoff'.

Altman and Sabato seek to develop a distress prediction model specifically for the SME sector, and to analyse its effectiveness compared to a generic corporate model they examined the fundamental role played by small and medium sized enterprises (SMEs) in the economy of many countries and the considerable attention placed on SMEs in the new Basel Capital Accord. The behaviour of financial measures for SMEs is analysed and the most significant variables in predicting the entities' credit worthiness are selected in order to construct a default prediction model. Using a logit regression technique on panel data of over 2,000 U.S. firms (with sales less than $65 million) over the period 1994–2002, a one-year default prediction model is developed. It is reported that this model has an out-of-sample prediction power which is almost 30 per cent higher than a generic corporate model. An associated objective is to observe the model's ability to lower bank capital requirements considering the new Basel Capital Accord's rules for SMEs.

Johnstone raises several theoretical issues for Altman and Sabato to consider. In particular, the point is emphasized that in contexts where model selection rests much more on 'goodness of fit' and apparent empirical explanatory power than on any coherent theory of distress, it is all the more important that all selection criteria are methodologically sound. While probability prediction models, particularly logistic regressions, are now common in distress prediction, model choice has remained a largely *ad hoc* exercise, with different authors following different models. Johnstone proposes several possible improvements to the approach taken by Altman and Sabato, and introduces the literature in statistics on probability scoring rules as potentially a very important source for progressing this branch of research.

Wong *et al.*'s 'Surviving Chapter 11 Bankruptcies' augments a previous model (developed by Wong's co-authors, Partington *et al.*, 2001) to better predict the duration of Chapter 11 bankruptcy and the payoff to shareholders. The current work uses a much larger sample to re-estimate the model and assess its stability. It also provides an opportunity for out-of-sample testing of predictive accuracy. The resulting models are based on Cox's proportional hazards model, but importantly it is recognized that there is the need to test two important assumptions underlying the model. First, that the hazards are proportional, and second, that censoring is independent of the event studied. Using the extended data set, all the previously significant accounting variables drop out of the model and only two covariates of the original model remain significant. These are the market-wide credit spread and the market capitalization of the firm, both measured immediately prior to the firm's entry to Chapter 11. Receiver operating characteristic curves are then used to assess the predictive accuracy of the original and extended models. The results show that Lachenbruch tests can provide a misleading indication of predictive ability out of sample. Using the Lachenbruch method of in-sample testing, both models show predictive power, but in a true out-of-sample test they fail dismally.

Fisher discusses Wong *et al.*, noting that the paper is 'a (significant) extension of the authors' previous work in Partington *et al.* (2001)'. It 'expands and updates the data set from the earlier paper, scrupulously tests the assumptions of the CPHM (i.e., proportional hazards and independent censoring), and uses both within-sample and out-of-sample tests of predictive accuracy. In sum, the paper is a very careful empirical analysis.' Fisher observes that the 'empirical results, however, are somewhat disappointing: several of the covariates become statistically significant with the expanded data set, tests for independent censoring produce conflicting answers, and the model predicts very poorly out of sample'. The discussant observes that the Wong *et al.* paper inspired a re-analysis of work undertaken previously on Canadian reorganization duration data (Fisher and Martel, 2004), noting that that data are not nearly as complete as those provided by Wong *et al.* for the Chapter 11 data. Fisher and Martel did not test for independent censoring, nor the proportional hazards specification. Further, they did not use the estimates to generate predictions, nor were the hazard estimates used to evaluate a hold-out sample. The motivation for the revised empirical analysis by Fisher presented at the Forum (and in his discussant's report) is merely to illustrate the advantages of using a parametric hazard function—that of being able to consider the issue of duration dependence—and to contrast the hazard function estimates with the logit model.

The final Forum paper switches attention to analysing issues of 'financial distress' in the public sector, with methodological issues to the fore. Jones and Walker's 'Explanators of Local Government Distress' examines the notion of what constitutes distress in the public sector, specifically in a local council setting, and how to determine a reasonable proxy for testing. The authors observe that the paper develops a statistical model to explain sources of distress in local government. Whereas 'financial distress' in the private sector has been equated with a failure to meet financial commitments, 'distress' is reinterpreted here as 'an inability to maintain pre-existing levels of services to the community'.[1] As the discussant (and the authors) acknowledge, since the late 1990s local councils in an Australian state (New South Wales) have been required to estimate the cost of restoring infrastructure assets to a satisfactory condition (a requirement which predates that form of reporting on infrastructure condition introduced as an option in the U.S. GASB 34).

This is the innovative aspect of Jones and Walker's paper. Information regarding the cost of restoring infrastructure is used as a proxy for levels of distress (in contrast to the binary classification that characterizes much prior private sector financial distress research). Data regarding service levels for a sample of 161 councils for 2001 and 2002 were used and a multiple regression model estimated and interpreted. The main findings were that the degree of distress in local councils is positively associated with the size of the population they serve and the size and composition of their revenues. Road maintenance costs featured prominently in results, as higher road program costs were associated with higher levels of distress (particularly when interacted with other variables). However, the revenue-generating capacity of councils had the strongest statistical impact on local government distress. Councils with lower percentages of rates revenue to total revenue and lower ordinary revenue levels to total assets were typically identified as more distressed. However, no systematic evidence was found that rural councils have higher distress levels than urban councils (i.e., both rural and urban councils serving larger populations were relatively more distressed than councils serving smaller populations). It is suggested that the model (or modifications thereof) may serve as an early warning system for those monitoring the circumstances and performance of local governments.

---

[1] Interestingly, as this *Abacus* issue was being prepared for publication the following press article appeared: 'Time Called on Sick Councils' (*Australian Financial Review*, 18 April 2007, p. 12). There it was noted that a 'Price Waterhouse report last year for the Australian Local Government Association found that between 25 and 40 per cent of local councils were unsustainable and that 30 per cent faced potential collapse'.

Discussant Ross Woodward, Deputy Director General, New South Wales Department of Local Government, praised this work, suggesting that with further refinement 'the model could be a valuable contribution to assist in the identification of councils in distress'. He suggested that several aspects could be explored further:

> The paper by Jones and Walker contributes to the development of a more robust system of asset management and financial reporting in New South Wales . . . [It] highlights the fact that distress indicators are currently limited and single dimensional . . .
>
> [Their] definition of distress as an inability to provide services to pre-existing levels is a valuable contribution to the quest to develop mechanisms by which it is possible to identify councils experiencing financial distress.

Woodward continued, noting that 'While some of the findings do not accord with DLG experience (e.g., DLG has not in practice found larger councils to be more financially distressed than smaller councils) and in some instances seem to be conflicting and contradictory, in a number of key areas they highlight areas already identified as those where local councils need assistance (e.g., roads and revenue)'.

Graeme Dean,
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May 2007

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DAVID A. HENSHER AND STEWART JONES

Forecasting Corporate Bankruptcy: Optimizing the Performance of the Mixed Logit Model

In recent studies, Jones and Hensher (2004, 2005) provide an illustration of the usefulness of advanced probability modelling in the prediction of corporate bankruptcies, insolvencies and takeovers. Mixed logit (or random parameter logit) is the most general of these models and appears to have the greatest promise in terms of underlying behavioural realism, desirable econometric properties and overall predictive performance. It suggests a number of empirical considerations relevant to harnessing the maximum potential from this new model (as well as avoiding some of the more obvious pitfalls associated with its use). Using a three-state failure model, the unconditional triangular distribution for random parameters offers the best population-level predictive performance on a hold-out sample. Further, the optimal performance for a mixed logit model arises when a weighted exogenous sample maximum likelihood (WESML) technique is applied in model estimation. Finally, we suggest an approach for testing the stability of mixed logit models by re-estimating a selected model using varying numbers of Halton intelligent draws. Our results have broad application to users seeking to apply more accurate and reliable forecasting methodologies to explain and predict sources of firm financial distress better.

Key words: Corporate bankruptcy; Distribution, conditional and unconditional; Estimation precision; Mixed logit.

The prediction of firm financial distress has been a major focus of academic research for more than three decades (Altman, 2002). The development of more powerful and accurate forecasting methodologies is of importance to a range of user groups, including shareholders, creditors, employees, suppliers, ratings agencies, auditors and corporate managers. As we have seen from the recent spate of corporate failures around the world, the fiduciary responsibilities of corporate management groups (the principal custodians of the financial health of business organizations) have become the focus of intense regulatory investigation and public scrutiny which has served to intensify their exposure to a variety of litigation

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and reputation risk.[1] Distress forecasts have a number of purposes of critical interest to corporate managers, such as in loan security evaluations made by banks and financial institutions, the monitoring of corporate solvency by regulators and credit rating agencies, and going concern assessments of auditors just to mention a few.

Recent studies by Jones and Hensher (2004, 2005, 2007a, 2007b) and Hensher *et al.* (2007) have introduced the theoretical and econometric underpinnings of advanced probability modelling in the prediction of corporate bankruptcies, insolvencies and takeovers. Prominent among these models are the nested logit model (see Jones and Hensher, 2007a), the mixed logit model (Jones and Hensher, 2004); latent class multinomial logit (Jones and Hensher, 2007b), and more recently the error component logit model (see Hensher *et al.*, 2007). These advanced probability models provided significantly greater explanatory and statistical power than standard logit models widely used in previous research. They conclude that all advanced models can potentially enhance the predictive performance of corporate bankruptcy and takeover probability models. However, the mixed logit (and its variants), being the most general of the advanced models (in the sense that mixed logit can approximate *any* choice model, see McFadden and Train, 2000), is likely to have the greatest overall potential in terms of underlying behavioural realism, desirable econometric properties and predictive performance.[2]

Train (2003) suggests that mixed logit and its variants have now supplanted simpler logit models in many areas of economics, marketing, management, transportation, health, housing, energy research and environmental science. These developments have resulted from the substantial improvements (particularly in terms of explanatory power and predictive performance) delivered by mixed logit over binary logistic and simplistic MNL models widely used in previous research (see, e.g., Altman, 2002). An important enhancement is that mixed logit models improve the behavioural realism of discrete choice modelling by relaxing the highly restrictive assumptions associated with the independent and identically distributed (IID) or constant variance error component and incorporating parameters which capture observed and unobserved heterogeneity both within and between firms. There is a considerable literature available which demonstrates that ignoring such considerations can potentially result in inferior model specification, spurious test results and invalid conclusions (Train, 2003; Jones and Hensher, 2004; Hensher *et al.*, 2005). With simpler logit models, all parameters are fixed (point estimates) and the error structure is treated as white noise, with little behavioural definition (see Ohlson, 1980; Jones, 1987; Altman, 2002; Jones and Hensher, 2007b). The complex nature of firm failure deserves a behaviourally more appealing and robust model form that recognizes the substantial amount of heterogeneity that can exist across and within all firms in terms of the role that attributes play in influencing an outcome domain (such as *levels* of financial distress). This heterogeneity can be captured in many ways, through the parameters of a model and the specification of the explanatory variables and errors.

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[1] See for example Report of the HIH Royal Commission, Volume I: *The Failure of HIH: A Corporate Collapse and its Lessons*; Volume II: *The Failure of HIH: Reasons, Circumstances and Responsibilities*; Volume III: *The Failure of HIH: Reasons, Circumstances and Responsibilities*, National Capital Printing, Commonwealth of Australia, 2003. The Commission's inquiry and subsequent court action led to the recent imprisonment of the CEO and founder of HIH (Ray Williams) and other senior executives of the organization.

[2] Jones and Hensher (2007b) compare the analytical and empirical properties of several advanced choice models in the context of takeovers research. The major advantage of the mixed logit model relative to other advanced models (such as nested logit and latent class MNL models) is that it allows for the complete relaxation of the IID condition by allowing all unobserved variances and covariances to be different, up to identification. Further, a variety of studies have now demonstrated the superior forecasting accuracy of mixed logit compared to standard logit (see, e.g., Brownstone *et al.*, 2000; Revelt and Train, 2000; Sándor and Wedel, 2002; Jones and Hensher, 2004).

Another way of stating this is that there exist sources of observed and unobserved heterogeneity that can be captured through the nonlinearity of parameters and variables. Nonlinear parameters can take the form of analytical distributions (e.g., normal or triangular), forming random parameters, and the decomposition of the error into components, some of which can vary over individual firms (as sources of unobserved heterogeneity). The absence of such a structure 'forces' all of the explanatory power of a model into fixed parameters and the explanatory variables *per se*, in a way that can severely limit a meaningful behavioural interpretation of the model (Train, 2003).

While the theory underpinning a mixed logit model is straightforward, estimation and interpretation issues can present serious challenges to the researcher, given their relative complexity and sophistication. The most important matters for the researcher to consider in deriving the maximum potential from using a form of mixed logit model include: (a) identifying the distribution assumptions imposed on random parameters and how these can impact on model performance, (b) identifying how effectively to incorporate prior information in model estimation and prediction, (c) developing an appropriate sampling methodology for mixed logit models, and (d) evaluating random parameter model stability and the selection of random parameters to include in model estimation.

Empirical data on these questions can help researchers maximize the value of these models as well as avoid some of the more obvious pitfalls associated with their use. Using a sample of firms listed on the Australian Stock Exchange (ASX), an ordered mixed logit (OML) model is estimated in which the outcome variable takes on three levels (two of which are classes of financial distress), and applied to a separate hold-out sample to investigate its predictive performance. For the OML model five specifications are assessed, four based on the population moments of the *unconditional* mixed logit model in which the random parameters are assumed to be distributed (a) normal, (b) triangular, (c) uniform and (d) lognormal; and a fifth in which individual-firm parameters are derived from a distribution of random parameters, *conditional* on the known outcome.

Following previous research (e.g., Palepu, 1986; Zmijewski, 1984), how sampling methodology affects parameter estimates and probability outcomes in a mixed logit design is examined. In particular we test the impact on model estimation by using a sample which more accurately reflects the actual composition of failure rates in practice, with alternative samples (such as matched pairs) using a weighted exogenous sample maximum likelihood (WESML) technique. Finally, we suggest a methodology for selecting random parameters and for testing the stability of mixed logit models using the simulated maximum likelihood technique under varying numbers of Halton draws.

EMPIRICAL FRAMEWORK

An Ordered Mixed Logit Model

Initially the formal expression for the ordered mixed logit model which is used as the basis of our empirical investigation is discussed. We assume, at a particular period of time, that a sampled firm ($q = 1, \ldots, Q$) is observed to be in a specific outcome domain associated with a set of J ordered alternatives. The firm is assumed to be exposed to the full set of alternatives (i.e., non-failure and classes of financial distress) and will seek to be in the domain which produces the best outcome. Some firms do, however, enter a domain which is not the best outcome (such as a class of failure). Within a sampled population firms are observed to be in different outcome domains associated with specific levels of explanatory variables. Understanding the role of specific variables in influencing a specific outcome domain is the modelling objective. An OML specification with random parameters explicitly recognizes the ordinality of the outcomes, avoiding arbitrary assumptions about scale (as in the case of linear regression models). It does this by defining points on the *observed scale* as thresholds that recognize, in preference space, that the numerical levels of the dependent variable are not strictly linear (Winship and Mare, 1984).

Formally, let Y_i^* denote an unobserved (or latent) continuous variable ($-\infty < Y_i^* < +\infty$), defined in utility space and $\mu_0, \mu_1, \ldots, \mu_{J-1}, \mu_J$ denote the threshold utility points in the distribution of Y_i^*, where $\mu_0 = -\infty$ and $\mu_J = +\infty$. Define Y_i to be an ordinal (observed) variable such that $Y_i = j$ if $\mu_{J-1} \leq Y_i^* \leq \mu_J$; $j = 1,2, \ldots J$ outcome levels. Since Y_i^* is not observed, the mean and variance are unknown. Statistical assumptions must be introduced such that Y_i^* has a mean of zero and a variance of one. To make the model operational, we need to define a relationship between Y_i^* and Y_i.

The ordered choice model is based on a latent regression model given as equation (1).

$$Y_i^* = \beta' \boldsymbol{x}_i + \varepsilon_i, \;\; \varepsilon_i \sim F(\varepsilon_i | \theta), E(\varepsilon_i) = 0, \mathrm{Var}(\varepsilon_i) = 1, \tag{1}$$

where θ collects mean and threshold parameters. The observation mechanism results from a complete censoring of the latent dependent variable as follows:

$$\begin{aligned} Y_i \quad & = 0 \text{ if } Y_i^* \leq \mu_0, \\ & = 1 \text{ if } \mu_0 < Y_i^* \leq \mu_1, \\ & = 2 \text{ if } \mu_1 < Y_i^* \leq \mu_2, \\ & \ldots \\ & = J \text{ if } Y_{i\,i}^* > \mu_{J-1}. \end{aligned} \tag{2}$$

The probabilities which enter the log likelihood function are given by equations (3) and (4).

$$\text{Prob}(Y_i = j) = \text{Prob}(Y_i^* \text{ is in the } j\text{th range}) \tag{3}$$

$$= F(\mu_j - \beta' \mathbf{x}_i) - F(\mu_{j-1} - \beta' \mathbf{x}_i), j = 0, 1, \ldots, J. \tag{4}$$

We can generalize the unobserved variance to accommodate multiplicative heterogeneity, as we do herein, and make this variance a function of contextual variables. Firm-specific heterogeneity is introduced into equation (4) through β_q. Thus,

$$\beta_q = \beta + \Delta \mathbf{z}_q + \eta_q, \tag{5}$$

or $\beta_{qk} = \beta_k + \delta_k' \mathbf{z}_q + \eta_{qk}$ where β_{qk} is the random coefficient whose distribution over firms depends in general on underlying parameters, $\mathbf{z}_q$ is observed data and η_q denotes a vector of K random components in the set of utility functions. The terms $\beta + \Delta \mathbf{z}_q$ accommodate heterogeneity in the mean of the distribution of the random parameters. The *mixed logit* class of models assumes a general distribution for β_{qk} and an IID extreme value Type I distribution for ε_{jiq}. For example, β_{qk} can take on different distributional forms such as normal, lognormal, uniform or triangular. Having briefly specified the model for empirical testing, a background to the empirical issues of this study follows.

Distribution Assumptions for Random Parameters

Critical to applying mixed logit models is the influence of the distributional assumptions imposed on random parameters (the distribution of β_{qk}). Is there a preferred distribution which can add to the predictive value of the model? As noted above, random parameters can take a number of predefined functional forms, the most common being normal, triangular, uniform and lognormal. All distributions are essentially arbitrary approximations to the real behavioural profile of the underlying data. We select specific distributions because of an expectation that the 'empirical truth' is somewhere in their domain. All distributions in common practice unfortunately have at least one major deficiency—typically with respect to sign and length of the tail(s). Truncated or constrained distributions appear to be the most promising direction, given recent discrete choice research (Hensher and Greene, 2003). For example, we might propose the generalized constrained triangular in which the spread of the distribution is allowed to vary within 10 per cent of the mean. The properties of the normal distribution are generally well known and are not discussed here. The uniform, triangular and log-normal are less well known and are documented below.

Uniform Distribution The spread of the uniform distribution (i.e., the distance up and below from the mean) and the standard deviation are different and while both can be used, the former is preferred in representing the uniform distribution. Suppose s is the spread, such that the time parameter is uniformly distributed from (mean minus s) to (mean plus s). Then the correct formula for the distribution is (mean parameter estimate + $s(2u - 1)$), where u is the uniformly distributed parameter. Since the distribution of u is uniform from 0 to 1, $2u - 1$ is uniform from

–1 to +1, then multiplying by s gives a uniform +/– s from the mean. The spread can be derived from the standard deviation by multiplying the standard deviation by $\sqrt{3}$.

Triangular Distribution For the triangular distribution, the density function looks like a tent: a peak in the centre and dropping off linearly on both sides of the centre. Let c be the centre and s the spread. The density starts at $c - s$, rises linearly to c, and then drops linearly to $c + s$. It is zero below $c - s$ and above $c + s$. The mean and mode are c. The standard deviation is the spread divided by $\sqrt{6}$; hence the spread is the standard deviation times $\sqrt{6}$. The height of the tent at c is $1/s$ (such that each side of the tent has area $s \times (1/s) \times (1/2) = 1/2$, and both sides have area $1/2 + 1/2 = 1$, as required for a density). The slope is $1/s^2$. See Evans *et al.* (1993) for formal proofs.

Lognormal Distribution The lognormal distribution is very popular for the following reasoning. The central limit theorem explains the genesis of a normal curve. If a large number of random shocks, some positive, some negative, change the size of a particular attribute, x, in an additive fashion, the distribution of that attribute will tend to become normal as the number of shocks increases. But if these shocks act multiplicatively, changing the value of x by randomly distributed proportions instead of absolute amounts, the central limit theorem applied to $Y = \ln(x)$ (where ln is to base e) tend to produce a normal distribution. Hence x has a lognormal distribution. The substitution of multiplicative for additive random shocks generates a positively skewed, leptokurtic, lognormal distribution instead of a symmetric, mesokurtic normal distribution. The degree of skewness and kurtosis of the two-parameter lognormal distribution depends only on the variance of the normal distribution, and so if this is low enough, the lognormal approximates the normal distribution. Lognormals are appealing in that they are limited to the non-negative domain; however, they typically have a very long right-hand tail which is a disadvantage. It is this large proportion of 'unreasonable' values that often casts doubt on the appropriateness of the lognormal distribution.[3]

The Role of Prior Information in Model Estimation and Prediction

The ordered mixed logit model assumes that the parameter estimates are based on an unconditional distribution, with or without random parameters. The distinction between unconditional and conditional distributions needs to be explained in more detail given its potential importance to predictive capability. An unconditional distribution herein produces an outcome probability for a firm that is conditional on the parameter value drawn from the distribution of the error component η (which in the random parameter model produces a parameter value on the distribution of the random parameters). The conditional distribution refers to a parameter estimate associated with an explanatory variable that is influenced by membership of a particular outcome class. For ordered mixed logit models, it is possible to have both conditions applying. To confuse matters, the literature often refers to an unconditional distribution in the context of not taking into account the outcome response (even though the parameter estimates are conditioned on the η—equivalent to the unconditional distribution).

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[3] In parameter estimation, the experience of many researchers has demonstrated that entering an attribute in a utility expression specified with a random parameter that is lognormally distributed, and which is expected *a priori* to produce a negative mean estimate, typically causes the model either not to converge or to converge with unacceptably large mean estimates. The trick to overcome this is to reverse the sign of the attribute prior to model estimation (i.e., define the negative of the attribute instead of imposing a sign change on the estimated parameter). The logic is as follows. The lognormal has a nonzero density only for positive numbers. So to ensure that an attribute has a negative parameter for all sampled individuals, one has to enter the negative of the attribute. A positive lognormal parameter for the negative of the attribute is the same as a negative lognormal parameter on the attribute itself.

The advantage, in principle at least, of the conditional distribution approach is that we can draw on additional information (or priors) to improve on the explanatory and predictive power of a model. In particular, the priors enable construction of estimates of 'firm-specific preferences' by deriving the conditional distribution based (within-sample) on known outcomes (i.e., prior knowledge), as originally shown by Revelt and Train (2000) (see also Train, 2003, chapter 11). These conditional parameter estimates are strictly 'same-outcome-specific' parameters, or the mean of the parameters of the subpopulation of firms that have the same outcomes. This is an important distinction[4] since it is not possible to establish for each firm their unique set of estimates, but rather to identify a mean (and standard deviation) estimate for the subpopulation which are observed to have the same outcome. We then take a random draw from this conditional distribution (in contrast to a draw from the full, unconditional distribution) in order to allocate parameter estimates to an individual firm that has the outcome that conditions this distribution.

To construct estimates of 'firm-specific preferences' the firm's conditional distribution based (within-sample) on their own outcomes are needed. Let $\mathbf{Y}_q$ denote the observed information on outcomes by firm q, and let $\mathbf{X}_q$ denote all elements of $\mathbf{x}_{jq}$ for all j. Using Bayes' Rule, the conditional density for the random parameters β_q is (Greene, 2005)[5]:

$$f(\beta_q \mid \mathbf{Y}_q, \mathbf{X}_q, \mathbf{\Omega}) = \frac{f(\mathbf{Y}_q \mid \beta_q, \mathbf{X}_q, \mathbf{\Omega}) f_\beta(\beta_q \mid \mathbf{\Omega})}{f(\mathbf{Y}_q \mid \mathbf{X}_q, \mathbf{\Omega})}, \tag{6}$$

where the elements of $\mathbf{\Omega}$ are the underlying parameters of the distribution of β_q. The left-hand side of equation (6) gives the density of the random parameter vector, given the underlying parameters and all the data on firm q *including their outcomes*. In the numerator of the right-hand side, the first term gives the probability in the conditional likelihood. The second term gives the marginal probability density for the random β_q with the assumed distribution of η_q. The denominator is the unconditional choice probability for the firm.

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[4] Discussion by the authors with Ken Train is appreciated.

[5] See also Train (2003) for discussion on 'individual-specific' parameters.

Estimation is undertaken through simulation to produce maximum simulated likelihood estimates for the conditional mean for each random parameter (equation 6). Greene (2005) sets out the full derivation. The approach can also be used to estimate the conditional variance or standard deviation of β_q by estimating the expected square and subtracting the square of the conditional mean. This estimated conditional variance will be smaller than the average variance obtained simply by computing the sample variance of the estimated conditional means, as the latter is averaged over all the data in the sample while the former is averaged with respect only to the data for firm q.

Estimation of the variance of the conditional means is not the population variance. This distinction is central to the proposed method. Estimation of the ordered mixed logit parameters gives an estimate of the variance of parameters in the population. The variance of the estimated conditional means is necessarily less than the estimated variance in the population, with the former approaching the latter as the number of outcomes faced by each firm increases without bound.[6]

The most recent advance in the application of mixed logit models is a recognition that the analyst can use the additional information on the observed outcome as a way of establishing a more behaviourally useful location on the distribution curve for a random parameter to position each firm (in contrast to a random assignment). The Bayesian literature has concluded that the inclusion of this additional information (a subjective prior) adds power to the performance of a model. While this position is correct, it is by no means the claim of the Bayesian method *per se* and indeed is also applicable to classical inference methods that are used in this paper (see Greene *et al.*, 2005; Huber and Train, 2001, for evidence).

Mixed Logit Models and Sampling Methodology

The influence of sampling methodology on parameter estimates and prediction outcomes has been an important consideration in many areas of accounting and finance research, but particularly bankruptcy forecasting and takeovers research (see e.g., Palepu, 1986; Zmijewski, 1984). As noted by Zmijewski (1984), a major methodological deficiency in many financial distress studies is the use of choice-based (non-random) samples, particularly the use of matched-pair samples (or any sample which does not closely reflect the composition of the population). Choice-based samples of this genre can result in parameter and probability estimates which are asymptotically biased. For instance, using a standard probit model, Zmijewski compared the results of six choice-based samples with varying bankruptcy frequency rates, ranging from 50 per cent (largest bias) to 4.8 per cent (smallest bias). Model estimates and probability outcomes were also compared using a weighted exogenous sample maximum likelihood (WESML) adjustment. Zmijewski reported that across the six choice-based samples, the sign and significance of parameter estimates remain largely unchanged irrespective of the failure frequency rate selected or whether the WESML adjustment was applied.

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[6] We thank Ken Train for this point. What we are doing, with conditional distributions, is akin to market segmentation on endogenous criteria.

However, he reported significant bias (particularly with respect to Type I errors) in classification and prediction rates both within the unadjusted samples and between the WESML adjusted samples and unadjusted samples.[7] This bias appeared to be significantly reduced when samples were based on failure frequency rates which approximated actual population rates. Sampling issues are also potentially important in mixed logit designs, which demand very high quality data for the estimation of parameters which capture observed and unobserved heterogeneity between and within firms, particularly random parameter estimates. Furthermore, to our knowledge, no accounting or finance study has examined the impact of parameter estimates and prediction outcomes of match-pair versus population samples in *multiple* outcome settings.

Selecting Random Parameters and Random Parameter Model Stability

The random parameters define the degree of unobserved heterogeneity, both between and within firms, through the standard deviation of the parameters and through interactions between the mean parameter estimate and deterministic segmentation criteria (the latter including other attributes of alternatives, socioeconomic and contextual descriptors and even descriptors of the data collection method and instrument). They are also the basis for accommodating correlation across alternatives and across outcome situations.

Estimating models in which many of the attributes of alternatives are considered as having random parameters can be demanding. The possibility of different distributional assumptions for each attribute (discussed above) should also be investigated, especially where sign is important. Establishing the appropriate set of random parameters requires consideration of the number (and type) of draws (discussed below) and the distributional assumptions. These interdependencies may make for a lengthy estimation process. Estimation of a standard multinomial logit model is an essential starting point for establishing candidate attributes and their (deterministic) functional form,[8] although it is limited value in the *a priori* selection of random parameterized attributes unless extensive segmentation on each attribute occurs. The selection of random parameters is as much an art as a science, but requires extensive model estimation to ensure that the selected set of covariates is indeed the full set of statistically significant random parameters.

Estimation of random parameters in a mixed logit model requires integration of the logit formula over the distribution of unobserved random effects across the set of alternatives. Outcome probabilities cannot be calculated exactly because the integral does not have a closed form in general; however, they can be approximated through simulation as described above (see Stern, 1997). This requirement for simulated maximum likelihood estimation is a potential source of weakness for mixed logit models due to the absence of a unique global set of asymptotically efficient parameter estimates (i.e., parameter estimates can vary depending on the chosen number of draws).

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[7] For the unadjusted samples, the failure frequency rate appeared to make a substantial difference to Type I classification and prediction errors. Compared to a match-pair sample, using a frequency rate much closer to the population (4.8 per cent) reduced Type I classification success from 92.5 per cent to 62.5 per cent, and prediction success rates from 97.6 per cent to 70.7 per cent. Within the WESML adjusted samples, Type I classification and prediction error rates were substantially higher than for the unadjusted samples.

[8] Regardless of what is said about advanced discrete choice models, the MNL model should always be the starting point for empirical investigation. It remains a major input into the modelling process, helping to ensure that the data are 'clean' and that sensible results (e.g., parameter signs and significance) can be obtained from models that are not 'cluttered' with complex relationships (see Louviere *et al.*, 2000, for discussion).

The number of draws required to secure a stable set of parameter estimates can vary greatly (see Hensher *et al.*, 2005). In general, it appears that as the model specification becomes more complex in terms of the number of random parameters and the treatment of preference heterogeneity around the mean, correlation of attributes and alternatives, the number of required draws increases for a given type of draw (e.g., Halton intelligent draws). There is no ideal number but the literature suggests that an outcome model with three alternatives and one or two random parameters (with no correlation between the attributes and no decomposition of heterogeneity around the mean) can produce stability with as low as twenty-five *intelligent* draws (e.g., Halton sequences—see Bhat, 2001, and Train, 2003, for discussion), although 100 appears to be a 'good' number. The best test, however, is to estimate models over a range of draws (e.g., 50, 100, 200, 500 and 1,000 draws). Confirmation of stability/precision for each and every model is crucial to establishing the overall validity of the selected model.[9] In this study we test the stability of our selected model by using various numbers of Halton intelligent draws and examine their impact on log-likelihood at convergence and marginal effects (sign and significance).

DATA COLLECTION AND SAMPLE

The Distress Classification Model

Drawing on the work of Jones and Hensher (2004), this study models financial distress in three different states, defined as follows:

State 0: nonfailed firms.

State 1: insolvent firms. Insolvent firms are defined as: (a) loan default, (b) failure to pay ASX annual listing fees as required by ASX Listing Rules, (c) a capital raising *specifically* to generate sufficient working capital to finance continuing operations, and (d) a debt/equity restructure due to a diminished capacity to make loan repayments.

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[9] One may well ask why the analyst does not simply select a larger number of draws in recognition of the greater likelihood of arriving at the appropriate set of stable parameter estimates. The reason why a smaller number of draws is a relevant consideration is essentially practical—the ability to explore alternative model specifications relatively quickly before estimating the preferred model on a large number of draws. Even with powerful computers, it can take hours of run time with many random parameters, large sample sizes and thousands of draws. To know when parameter stability cuts in can be of great practical value, enabling the researcher to search for improved models in a draw domain that is less likely to mislead the inferential process. This study provides a practical demonstration of how the number of Halton draws can impact on model estimation and random parameter stability.

State 2: firms which filed for bankruptcy followed by the appointment of receiver managers/liquidators.[10] For the purposes of this study, states 0–2 are treated as mutually exclusive states within the context of an ordered mixed logit model.

Sample Selection

Two samples for the purposes of model estimation and validation are used. The estimation sample is based on firm financial distress data collected between 1996 and 2000. Over this period data are collected to generate a sample of failed firms (state 2); and a sample of insolvent firms (state 1). Data were collected up to five annual reporting periods on all firms in categories 0, 1 and 2 subject to the conditions discussed below. Up to five annual reporting periods of financial statement data are collected for each firm prior to the announcement of failure to the market. The date of the failure announcement was ascertained from the ASX's Signal G release.[11] The same procedure was followed for firms in the insolvency state 1. This produced a final useable sample of 2,838 firm years in the nonfailed state 0; and 78 and 116 firm years in states 1 and 2 respectively. Following the approach suggested by Zmijewski (1984), we used a sample of failed and nonfailed firms which better approximates actual fail rates in practice.[12] Later we compare models estimated on this sample with a series of randomly selected match-pair samples to assess the impact of sampling methodology on mixed logit model estimates and predictions.

A validation sample was collected for the period 2001–03 which applied the same definitions and procedures used in the estimation sample.[13] This produced a final useable sample of 4,980 firm years in the nonfailed state 0; and 119 and 110 firm years in states 1 and 2 respectively. Checks were made to ensure that insolvent/failed firms identified in states 1 and 2 for the estimation sample were not included in the validation sample. Following standard practice in the literature, insolvent/failed firms in the validation sample were also excluded from the estimation sample.

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[10] Included in state 2 are three principal forms of bankruptcy proceeding available under the legislative provisions of the Australian *Corporations Act* (2001): (a) voluntary administration (first introduced in Australia in June 1993 under the *Corporate Law Reform Act*, 1992); (b) liquidation and (c) receivership. Most firms which failed fell into categories (b) and (c).

[11] Signal G disclosures are regulated by the ASX Listing Rule 3.1 which identifies the types of information which Australian companies must disclose to the market on a timely basis. Examples include: the appointment of a receiver or liquidator, information relating to mergers and takeovers, capital reorganizations, loan defaults, share issues, failure to pay listing fees and any other information which could have a material affect on the value of a company's securities (see also ss 674 and 675 of the *Corporations Act, 2001*). Information for release to the market must be lodged by companies with the ASX's company announcement office (CAO), which is then immediately released to the market under Signal G (see Explanatory Note, ASX Listing Rules, Chapter 3, 97, 575; and Chapter 15 of the listing rules). Because all Signal G market releases are electronically dispatched (in 'real time'), an accurate determination could be made whether a firm's financial statements were released before or after the announcement of failure.

[12] Jones and Hensher (2004) report an average fail rate (for Australian public companies) of 2–3 per cent over their sample period 1996–2003.

[13] Joy and Tollefson (1975) note that hold-out samples drawn from the same time period as the original sample will not provide an intertemporal validation, and hence cannot provide an adequate test of a model's predictive ability.

Only publicly listed firms on the ASX are included in the estimation and validation samples. With respect to the sample of insolvent firms, the same data collection procedures were used as with failed firms. The financial report prior to the indication of the firm's solvency problem was used for estimation purposes. Indication of a firm's insolvency problem was ascertained from the analysis the ASX's Signal G releases, as was the case with failed firms.[14]

Explanatory Covariates

We examine a broad range of financial measures used in prior bankruptcy research over the last three decades in model estimation (examples include Altman *et al.*, 1977; Ohlson, 1980; Zmjewski, 1984; Casey and Bartczak, 1985; Gentry *et al.*, 1985; Jones, 1987). Specifically, we test a number of ratio measures based on: cash position; operating cash flow (both reported and estimated); working capital; profitability and earnings performance; turnover, financial structure; and debt servicing capacity. A list of variables used in this study, including their definitions, is provided in the Appendix. An examination of the partial correlations indicates generally relatively weak correlations across most of our covariates, which suggests that most of our explanatory variables are providing unique information in the analysis. We also test Jones and Hensher's (2004) contextual variables. Essentially these are industry variables classified across four major sectors: the old economy sector, the new economy sector, the resources sector and the financial services sector.[15] Recent studies by of the authors have investigated the explanatory and

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[14] For the estimation sample, financial statement data were collected on firms in each of the three states from four major sources: (a) Aspect Financial Pty Ltd's FinAnalysis Database (2003) and DataAnalysis Database (2003)—two leading Australian financial database sources which contain up to fifteen years of historical data on all listed companies in Australia; (b) Huntley's Delisted Company Database (1993–99), which contains all delisted firms in Australia since 1999; (c) ASX Market Comparative Analysis, 2003; and (d) company financial statements collected from the Australian Securities and Investment Commission (ASIC). For the validation sample, all the financial data and failure statistics are generated from a customized data feed provided commercially to the authors by AspectHuntley Pty Ltd. AspectHuntley was created in 2003 from a merger of two leading data providers in Australia—Aspect Financial Pty Ltd and Huntley's Financial Services.

[15] Firms in the new economy sector are classified according to the ASX industry classification guidelines, outlined in the ASX Market Comparative Analysis (2003). These are: (a) health and biotechnology, (b) high technology, (c) internet firms and (d) telecommunications. Furthermore, in Australia, the resources sector constitutes the largest and single most important export industry—nearly 30 per cent of all listed firms in Australia are resource companies (see ASX Market Comparative Analysis, 2003). The resources sector is classified by the ASX as: (a) gold companies, (b) other metals and (c) diversified resources. Financial services are defined by the ASX as banks and finance houses, insurance companies and investment and financial services companies. Old economy firms are defined for the purpose of this study as all firms not being in the new economy, resources and financial services sectors.

TABLE 1

RANDOM AND FIXED PARAMETER ESTIMATES FOR FINAL ORDERED MIXED LOGIT OUTCOME MODEL (50 HALTON DRAWS)

Variables		Parameter estimates (*t*-values)
Fixed parameters		
Constant		–2.687 (–15.13)
Working capital to total assets		–.0055 (–8.56)
Cash flow cover		–.0030 (–3.060)
Resources firm (1,0)		–.9546 (–2.259)
Random parameter means		
Cash resources to total assets		–.0916 (–2.927)
Net operating cash flows to total assets		–.01978 (–4.38)
Total debt to equity		–.0002 (–.115)
Standard deviations of random parameters		
Cash resources to total assets		.2446 (4.168)
Net operating cash flows to total assets		.0350 (3.44)
Total debt to equity		.0166 (3.544)
Heterogeneity in means		
Cash resources to total assets*Resources		.0581 (1.80)
Threshold parameters		
μ (0 to 1)	Mu(01)	0
μ (1 to 2)	Mu(12)	1.286 (9.29)
Log-likelihood at zero		–2,057.4
Log-likelihood at convergence		–802.8
Sample size		7,860

predictive power of market prices and macroeconomic factors such as interest rates and economic cycles (see Hensher *et al.*, 2007; Jones and Hensher, 2007b).[16]

EMPIRICAL RESULTS

Alternative Distributions

A series of OML models was estimated to identify a preferred model that satisfied both behavioural and statistical coherence (see Table 1). The particular form of the model involved an ordered set of outcomes (noting that order is a special case of the more general model). The OML model introduces additional parameters to represent thresholds of marginal value between the outcome levels (full details are given in Winship and Mare, 1984). We investigated four analytical distributions for the random parameters (normal, uniform, lognormal and triangular) for the OML model and found that the triangular distribution gave the better overall goodness of fit (and which translated into the best predictive performance on a hold-out sample).[17]

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[16] It is interesting to note that while excess market returns were found to be statistically significant in these studies, a number of macroeconomic variables (such as the impact of interest rate changes) were not found to be significant.

We do not report the model-fit summary for the standard logit model. Consistent with Jones and Hensher (2004), the standard model was found to be statistically inferior (as well as having much poorer predictive accuracy). The log-likelihood for the OML has decreased from –2,057 (assuming no information other than random shares) to –802. Further, Table 1 indicates that some variables have a single fixed parameter, whereas three variables (cash resources to total assets, net operating cash flow to total assets, and total debt to total equity) have up to three parameters representing their role. Unobserved heterogeneity, which is captured by the standard deviation parameters, is statistically significant for all three financial variables. A major advantage of the mixed logit model relative to standard logit models used in much previous research is the opportunity to establish the role of the mean and variance influence of a particular variable through the structure of its parameter space. Standard logit models are limited by restrictive assumptions associated with the IID condition which can result in significant information loss in model estimation. This has been shown to affect the behavioural coherence of the model as well as its predictive performance (see Train, 2003; Jones and Hensher, 2004, 2007b).

The Predictive Performance of the Mixed Logit: Conditional and Unconditional Distributions

Using the hold-out sample described above, we can develop predictions based on the unconditional distribution or the conditional distribution. The latter uses firm-specific parameters for each of the three random parameters that have been conditioned on knowledge of the outcomes from the sample of firms used in model estimation.

The use of conditional distributions is appealing in the sense that one is using all the information available from the data to refine the parameter estimates that need to be used in applying the model. However, if the application was being undertaken within sample (i.e., with the exact same data, or a sample within those data, used for model estimation), we would expect an improvement over the unconditional distribution, since the latter does not use the additional conditional relationship offered by the known outcome (i.e., dependent variable). Unless we are able to provide with confidence a mapping between each of the firm's used in model estimation with one or more firms in the hold-out sample (using some exogenous criteria, appropriately parameterized, for mapping) then the only recourse is to allocate randomly parameters from the conditional or unconditional distribution to each firm in the hold-out sample.

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[17] One possibility for the relatively stronger predictive performance of the triangular distributions is that they do not exhibit the long tails of other distributions (such as normal), which results in the data being more focused around the mean but still permitting a reasonable distribution for the data.

We investigated ways of establishing a mapping, using a data mining technique known as MARS (multivariate adaptive regression splines), searching for optimal exogenous variable transformations and interactions to explain the systematic variation in each of the random parameters within the modelled sample. As valuable as this technique is, it failed to find any mapping capability within the set of variables available in our data set that produced an explanation of the variability sufficiently high to provide an improved predictive performance on the hold-out sample by using a random allocation from a normal distribution. The only variable that made a major contribution to the mapping was the resources sector variable, but unfortunately dummy variables are of limited use, since the essential rule for mapping is to allocate from a continuous distribution of an exogenous variable.

Prior to reporting the predictive performance of the model, it is important to clarify our position on exactly how the model must be applied to assess its predictive success. We implement a sample enumeration methodology which recognizes that the estimated model is based on a sample drawn from a population and that the application of the model must preserve the full distribution of information obtained from the model system. This includes the outcome probabilities. Their meaning is to be interpreted at the sample level and not at the level of each individual firm. Thus is it essential to aggregate the probabilities associated with each outcome across the entire sample to obtain the predicted outcome values (i.e., the absolute number of firms predicted to be in each outcome category or outcome category shares). While the practice of identifying the outcome probability associated with each outcome for each firm is common and supported in practice in accounting and finance research, the use of threshold probabilities to assign firms to specific predicted outcomes does not represent a correct application of discrete outcome models (see Jones and Hensher, 2004; Hensher *et al.*, 2005).[18]

The overall predictive performance of the mixed logit model can be determined by deriving the predicted probabilities for each firm for each outcome and then aggregating the probabilities for each outcome (see Jones and Hensher, 2004). Under the unconditional approach, some explanatory variables are a composite function of a mean parameter, a distribution around the mean resource effect. Each individual firm is 'located' in parameter space on the triangular distribution for three random parameter variables (cash resources to total assets, net operating cash flow to total assets and total debt to equity). The formulation used to derive the contribution to relative value of each outcome is:

Preference distribution for cash resources to total assets
$= -.09161 - .05817 * \text{Resources} + .24460 * T$

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[18] That is, imposing a cut-off allocation rule such as assigning an outcome probability of 1.0 to the alternative whose model derived outcome probability is greater than a specific value (e.g., 0.5 for a binary outcome) is arbitrary and not consistent with the intent of these models. Models based on samples can only state that a firm may have a specific outcome (given levels of influencing attributes) up to a *probability of that outcome occurring*. The common practice of arbitrarily adjusting the cut-off values (especially in binary outcome models) to improve the classification fit is a particulary concerning violation of the basic properties of these models.

Preference distribution for net operating cash flow to total assets
$= -.01978 + .03505 * T$

Preference distribution for total debt to equity
$= -.0002 + .01668 * T$

where T is defined as follows (given a value V drawn for a triangular distribution): $\text{if}(v <= 0.5) T = \text{sqr}(2 * V) - 1$; $(\text{ELSE}) T = 1 - \text{sqr}(2 * (1 - V))$

For the unconditional distribution we use the formulae above together with the threshold parameters (μ) and the fixed parameters to derive the inputs into the prediction formula; for the (outcome) conditioned distribution we use the mean and standard deviation of the distribution of firm-specific allocated parameters and impose a triangular distribution on how they are randomly allocated amongst the hold-out sample. Both approaches produce, for each firm, a value for Xb, which is fed into the calculation of a set of three outcome probabilities using the formula set:

$$\begin{aligned} P0 &= \text{Phi}(-Xb) \\ P1 &= \text{Phi}(Mu1 - Xb) - P0 \\ P2 &= 1 - P1 - P0 \end{aligned}$$

Implementing a sample enumeration strategy on our hold-out sample, we can compare the predictive performance of our model for the unconditional and conditional distributions across our three states of financial distress. Table 2 displays

TABLE 2

FORECASTING PERFORMANCE OF FINAL ORDERED MIXED LOGIT MODEL WITH CONDITIONAL AND UNCONDITIONAL DISTRIBUTIONS ACROSS DISTRESS STATES 0–2

Condition	Nonfailure (0)		Insolvent (1)		Failure (2)	
	Actual	Predicted	Actual	Predicted	Actual	Predicted
Pooled data (reporting periods 1–5)						
UD	96.97%	95.80%	1.4%	2.1%	1.5%	1.9%
CD	98.60%	95.8%	.76%	2.19%	.63%	1.9%
Last reporting period prior to failure						
UD	96.04%	96.1%	1.6%	2.1%	2.3%	1.7%
CD	98.3%	96.1%	.85%	2.1%	.78%	1.74%
Third reporting period prior to failure						
UD	96.70%	96.30%	1.41%	1.89%	1.84%	1.78%
CD	98.97%	95.2%	.53%	2.5%	.49%	2.1%
Fifth reporting period prior to failure						
UD	97.20%	96.3%	1.36%	2.07%	1.35%	1.61%
CD	98.3%	96.3%	.94%	2.07%	.74%	1.61%

Note: UD = unconditional distribution, CD = conditional distribution.

the forecasting accuracy of the OML model on the validation sample using both unconditional and conditional distributions. Based on the pooled observations (all observations across reporting periods 1–5), the unconditional distribution is 97 per cent accurate in predicting the nonfailed group, 79 per cent accurate in predicting the outright failure category and 67 per cent accurate in predicting the insolvency state. In contrast, the conditional distribution predictions are less impressive, with only a 33 per cent accuracy rate in predicting outright failure and 35 per cent accuracy in predicting the insolvency state. The best accuracy rates for conditional distribution occurred in the third reporting period prior to failure where the model is 99 per cent accurate in predicting nonfailure, 97 per cent accurate in predicting outright failure and 75 per cent accurate in predicting insolvency. In contrast, the conditional distribution model was only 23 per cent accurate in predicting outright failure and 21 per cent accurate in predicting the insolvency category. The performance of the unconditional model is also respectable five reporting periods prior to failure, with an accuracy rate of 84 per cent in predicting outright failure and 66 per cent in predicting insolvent firms.

Our prediction tests are at the *population* level, not at the firm-specific level. As pointed out by Hensher *et al.* (2007), from a policy decision perspective, the *behavioural responsiveness* of changes in attribute levels on outcome probabilities will usually provide more meaningful information to decision makers than classification accuracy alone (particularly at the firm-specific level). For example, they provide an example of a lending institution that is evaluating whether to extend a loan to a company, and to protect the security of the debt seeks to frame some pertinent debt covenants tied to key areas of the performance of the company. In order to develop the most appropriate set of covenants, the lender would want to know the responsiveness of changes in the level of key performance indicators (such as debt to equity) to the likely impact on financial distress. The lender is likely to choose covenant indicators that have the greatest overall responsiveness or sensitivity to the likelihood of financial distress. Hence, a more robust test of the firm distress model's performance out-of-sample is whether the model's elasticities or marginal effects are stable and consistent when applied to real world situations, or on a hold-out sample (see Hensher *et al.*, 2007, for further discussion).

Impact of Sampling Methodology on Model Estimation

We compared the performance of the estimated model in Table 1 (which is based on a failure frequency rate close to actual population rates) with a series of OML models estimated using match-pair samples. The sample of nonfailed firms ($Y = 0$) and insolvent firms ($Y = 1$) was randomly selected from the estimation sample and matched with the failed firms. This process of random selection was repeated several times to gain greater insight into the impact of different sample size compositions on model estimation. We find that match-pair samples appear to undermine significantly the performance of mixed logit models as well as affecting the significance of parameter estimates. Further, the overall goodness-of-fit for the mixed logit model reported in Table 1 was much poorer when a match-pair sample was used for the same set of covariates (the log-likelihood ratio only decreased from –567 to –576 for the match-pair sample). Further, the model estimated on the match-pair sample produced inconsistent and illogical parameter estimates. To more clearly demonstrate this, the marginal effects for the model estimated in Table 1 and the model estimated using the match-pair sample must be provided. Marginal effects are needed because a direct interpretation of the parameter estimates reported in Table 1 is not possible given the logit transformation of the outcome dependent variable required for model estimation. Marginal effects are defined as the derivatives of the probabilities which have substantive behavioural meaning (Louviere *et al.*, 2000). A marginal effect is the influence a one unit change in an explanatory variable has on the probability of selecting a particular outcome, *ceteris paribus*. This holds for continuous variables only. For dummy (1, 0) variables, the marginal effects are the derivatives of the probabilities given a change in the level of the dummy variable and thus represent the influence of a change in level of the variable upon the probability of choosing a given outcome, *ceteris paribus* (marginal effects are derived in Jones and Hensher, 2004). Importantly, the marginal effects need not have the same sign as the model parameters. Hence the statistical significance of a model parameter does not imply the same significance for the marginal effect. Table 3 displays the marginal effects for the model reported in Table 1 and a model estimated using the match-pair sample.

TABLE 3

MARGINAL EFFECTS FOR SIGNIFICANT COVARIATES IN FINAL ORDERED MIXED LOGIT

Variables	Prob. ($Y = 0$) (*t*-values)	Prob. ($Y = 1$) (*t*-values)	Prob. ($Y = 2$) (*t*-values)
Panel A: Based on a sample which approximates actual failure rates			
Working capital to total assets	.00014 (5.03)	–.0000999 (–5.1)	–.0000402 (–3.56)
Cash flow cover	.0000783 (2.61)	–.0000558 (–2.62)	–.0000224 (–2.16)
Resource sector (1,0)	.01792 (2.95)	–.01282 (–2.96)	–.0051 (–2.83)
Cash resources to total assets	.00232 (4.52)	–.01282 (–2.96)	–.00066 (–4.58)
Net operating cash flow to total assets	.0005 (3.767)	–.00035 (–3.79)	–.00014 (–2.85)
Total debt to total equity	.0000056 (.581)	–.000007 (–.581)	–.0000028(–.55)
Panel B: Based on matched-pair sample			
Working capital to total assets	.00069 (2.25)	.00002 (1.86)	–.000098 (–2.26)
Cash flow cover	.0001489 (4.32)	.000623 (2.38)	–.00211 (–3.16)
Resource sector (1,0)	.15439 (2.20)	.02217 (1.30)	–.17656 (–2.68)
Cash resources to total assets	–.00715 (–4.77)	–.00299 (–2.65)	.01014 (4.45)
Net operating cash flow to total assets	.002079 (2.48)	.000871 (1.95)	–.00295 (–2.47)
Total debt to total equity	–.0006 (–5.12)	–.000025 (–2.60)	.00088 (4.517)

Panel A results report the marginal effects for the model estimated on the full sample. Nearly all covariates have logical and consistent signs. For example, working capital to total assets has a positive coefficient on the nonfailure outcome ($Y = 0$) indicating that a unit increase in this ratio increases the probability of nonfailure. The negative coefficients on the other domain outcomes ($Y = 1$ and $Y = 2$) suggest that increasing this ratio increases the probability of insolvency or outright failure. The only coefficient that is inconsistent in Panel A is total debt to total equity; however, the marginal effects are statistically insignificant on this variable across all domain outcomes. The marginal effects in Panel B resulted from the best matched-pair model (in terms of behavioural coherence and statistical significance) that we could generate by randomly assigning firms from the nonfailed group. As can be seen in Panel B, most of the covariates are statistically significant, but many have illogical or inconsistent signs (consider, for example, the total debt to equity ratio which has a negative coefficient on the insolvency outcome; or the net operating cash flow to total assets ratio which has a negative coefficient on the outright failure outcome). We do not report the predictive accuracy of the unconditional mixed logit model based on the match-pair sample as the results were found to be far inferior to the forecasting results reported in Table 2. The most likely factor causing these results is sample size in a three-state failure setting. Selecting a subsample of data based on matching the sample size of each outcome to the outcome with the least number of observations has substantially reduced the discriminatory power of the model.

Assessing the Stability of the Mixed Logit Model

In order to evaluate the estimation precision or stability of the model reported in Table 1 we re-estimated the model several times using different numbers of Halton intelligent draws. We compared the model-fit summary for each random draw and the marginal effects for the covariates reported in Table 1 across several draw sequences ranging from fifty random draws to 1,000 draws. The *t*-values for marginal effects of the Table 1 covariates are shown in Table 4. We find that the log-likelihood at convergence is virtually unchanged across the number of draws, suggesting that the model in Table 1 has a high level of stability across random draws. This conclusion is also reinforced by analysis of the *t*-values of the marginal effects in Table 4, which shows that the signs and significance levels of all covariates in Table 1 remain virtually unchanged across the domain outcomes and across different numbers of random draws. Together, these results confirm the high estimation precision/stability of the model reported in Table 1.

CONCLUSIONS

The mixed logit model is the most generalized of all discrete probability models and is capable of accommodating a richer specification of firm-specific observed and unobserved heterogeneity between and within firms than is achievable with a standard logit model. This is possible because mixed logit allows for a complete relaxation of the restrictive IID condition and the inclusion of model estimates

TABLE 4

LOG-LIKELIHOOD RATIO AND t-VALUES OF MARGINAL AFFECTS FOR COVARIATES ACROSS VARYING NUMBERS OF HALTON DRAWS

Log-likelihood at convergence	−802.8242	−802.5943	−803.0258	−803.0441	−803.008
$Y = 0$ (nonfailure)	50	100	200	500	1,000
Working capital to total assets	7.32	7.28	7.28	7.35	7.34
Cash flow cover	5.35	5.39	5.47	5.50	5.50
Resource sector (1,0)	5.17	5.15	5.11	5.11	5.10
Cash resources to total assets	10.71	11.23	10.47	10.17	10.12
Net operating cash flow to total assets	8.52	8.32	8.31	8.36	8.40
Total debt to total equity	.529	.581	.77	.75	.75
$Y = 1$ (insolvency)	50	100	200	500	1,000
Working capital to total assets	−7.36	−7.32	−7.33	−7.39	−7.38
Cash flow cover	−5.36	−5.40	−5.49	−5.51	−5.51
Resource sector (1,0)	−5.16	−5.14	−5.10	−5.10	−5.10
Cash resources to total assets	−10.75	−11.28	−10.50	−10.19	−10.15
Net operating cash flow to total assets	−8.58	−8.37	−8.37	−8.44	−8.45
Total debt to total equity	−.529	−.581	−.777	−.751	−.753
$Y = 2$ (outright failure)	50	100	200	500	1,000
Working capital to total assets	−7.17	−7.15	−7.14	−7.22	−7.22
Cash flow cover	−5.09	−5.13	−5.20	−5.23	−5.24
Resource sector (1,0)	−5.64	−5.61	−5.57	−5.59	−5.58
Cash resources to total assets	−16.01	−16.90	−15.54	−14.92	−14.82
Net operating cash flow to total assets	−7.99	−7.81	−7.80	−7.89	−7.89
Total debt to total equity	−.537	−.591	−.795	−.768	−.77

(in addition to fixed parameters) for random parameter means and standard deviations, and heterogeneity in random parameter means as well as parameter estimates for decomposition in variances. Standard logit models are confined to fixed parameters (point estimates) and the error structure is essentially treated as white noise (IID condition), with little behavioural definition. This paper discusses a number of ways to optimize the explanatory and predictive performance of the mixed logit model in practice.[19]

The most recent advances in the application of mixed logit models relates to distribution assumptions imposed on random parameters, and the recognition that the researcher can use the additional information on the observed outcome as a way of establishing a more behaviourally useful location on the distribution curve for a random parameter in order to position each firm (in contrast to a random assignment which characterizes an unconditional model). Such advancements carry important implications for the predictive performance of discrete probability models such as mixed logit. The Bayesian literature advocates the view that inclusion of this additional information (a subjective prior) adds power to the performance of a model. This is by no means the claim of the Bayesian method *per se* and indeed is also applicable to classical inference methods that are used in this paper.

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[19] Notwithstanding the relatively greater complexity of advanced logit model structures (particularly mixed logit), recent developments in computer software and simulation techniques have made mixed logit estimation a relatively easy and quick process (for instance, the model reported in Table 1 of this paper only took a few minutes to estimate using LIMDEP/NLOGIT software).

The focus here has been on contrasting the predictive performance of mixed logit models in which we impose different distributional assumptions of the form of the firm-specific observed and unobserved heterogeneity (in particular, normal, triangular, uniform and lognormal) as well as assessing the contribution of prior information on each firm's outcome in allocating firms to specific locations on the preference heterogeneity distribution (instead of a random assignment when such priors are not known).

This study investigates five applications of the OML model, four based on the population moments of the *unconditional* mixed logit model in which the random parameters are assumed (a) normally distributed and (b) triangular distributed, (c) uniformly distributed and (d) lognormally distributed, and a fifth in which individual-firm parameters are derived from a triangular distribution of random parameters, *conditional* on the known outcome.

The unconditional triangular distribution appears to offer the best predictive performance on the hold-out sample. Although conditional distributions add more information, the predictive performance is less impressive than unconditional distributions *when the model is applied out of sample* (as in the case of a hold-out sample). We attempted to develop a mapping between each hold-out sample and each firm in the estimation sample, but did not find any statistically significant contextual variables that enabled such a mapping. The random allocation of individual parameters between a firm in the estimation sample and in the hold-out sample gave as good a predictive performance as any mapping construct.

Multinomial mixed logit models appear to be much more sensitive to sampling methodology relative to previous studies which have been based on standard logit models in binary outcome settings. The highest level of statistical performance for a mixed logit model arises either when a weighted exogenous sample maximum likelihood (WESML) technique is applied to failure frequency rates or when samples more closely reflect the actual composition of the population. While this result may be expected, use of other sampling techniques (such as match-pair samples) in a three-state model setting caused a significant deterioration in the explanatory and predictive performance of the mixed logit model.

The requirement for simulated maximum likelihood estimation is a potential source of weakness for mixed logit models due to the absence of a unique global set of asymptotically efficient parameter estimates (i.e., parameter estimates can vary depending on the chosen number of draws). Hence, it is critical to examine closely a selected model to ensure its underlying estimation precision and validity. A methodology for assessing the stability of mixed logit models by re-estimating the selected model using varying numbers of Halton intelligent draws was used. The log-likelihood ratios at convergence and the signs and significance levels of marginal effects were found to remain largely unchanged after subjecting the model to varying numbers of Halton intelligent draws (ranging from fifty to 1,000). This suggests that the chosen model has a high level of estimation precision or stability.

Finally, a common criticism of simple or naive bankruptcy models is that they lack theoretical and explanatory content (see Hensher *et al.*, 2007; Jones and Hensher, 2007a, 2007b). In terms of model performance and evaluation, the theoretical and explanatory role of predictor variables has tended to take a secondary role to classification accuracy. Hensher *et al.* note that the real value of any behavioural model is predicting what might happen when one varies the level(s) of one or more statistically significant influence on the outcome domain (an elasticity effect). Given the many inherent practical difficulties in accurately predicting corporate failures at the firm-specific level, the preoccupation in the literature with firm-specific prediction appears somewhat misplaced. A major reason for using an advanced logit structure, such as mixed logit, is to instill a greater level of behavioural definition and explanatory richness in model estimation. While classification accuracy also remains an important objective of advanced models, advanced model forms have a distinct advantage over simpler models if the researcher seeks to gain deeper insight into the role, influence and behavioural responsiveness of specific explanatory variables on different states of financial distress.

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APPENDIX

DEFINITION OF VARIABLES

Variable acronym	Definition
Explanatory variables	
Netopta	Net operating cash flow by total assets
Netoptr	Net operating cash flow by sales revenue
Cfcover	Net operating cash flow by annual interest payments
Cdebtc	Total debt by gross operating cash flow
Cpta	Cash, deposits and marketable securities by total assets
Cpcl	Cash, deposits and marketable securities by current liabilities
Current	Current assets by current liabilities
Workcta	Working capital (current assets—current liabilities) by total assets
Cgear	Total debt by total equity
Tlte	Total liabilities to total equity
Debtta	Total debt to total assets
Cmardeb	Market value of equity by total debt
Tlta	Total liabilities to total assets
Nicover	Reported EBIT by annual interest payments
Ebitta	Reported EBIT by total assets
Roe	Return on equity
Roa	Return on assets
Crg	Annual growth in sales revenue
Csalesta	Total sales revenue by total assets
Creta	Retained earnings by total assets
Re1yr	Annual growth in retained earnings
Contextual variables	
Industry classification	
New_econ	If a new economy firm coded 1, 0 otherwise
Resource	If a resources firm coded 1, 0 otherwise
Old_econ	If an old economy firm coded 1, 0 otherwise
Finance	If a financial services firm coded 1, 0 otherwise
Size variable	
Logta	Natural log of total assets

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EGON KALOTAY

Discussion of Hensher and Jones

The study by Hensher and Jones (hereafter HJ) builds on earlier work by the authors published in *The Accounting Review*. Specifically, Jones and Hensher (2004) implement a sophisticated *mixed logit* approach to the modelling of distress risk using fundamental variables. In so doing they explain and illustrate the potential benefits of recent advances in discrete choice modelling that do not rest on the strong assumptions of more traditional alternatives.

More specifically, in a mixed logit model the probability of obligor n being in state i is:

$$P_{ni} = \int L_{ni}(\beta)f(\beta)d\beta, \qquad (1)$$

where the mixed logit probability P_{ni} is a weighted average of logit probabilities $L_{ni}(\beta)$ evaluated at different values of the logit model parameters β, with $f(\beta)$ as the mixing (or probability weighting) distribution.

The benefits of this approach can be explained in at least two ways.

First, mixed logit is flexible with respect to the correlation structure and distribution of the errors that drive choice or, in the case of this paper, default state, whereas standard logit assumes the model errors are independently and identically distributed extreme value.

Alternatively, as implied by equation (1), mixed logit can be viewed as a way of accommodating heterogeneity in the parameters that map observable characteristics to bankruptcy state probabilities. This characterization is useful to emphasize the point that if one knew the correct restrictions to place on β, then there would be no need for mixed logit.[1]

The challenges in applying mixed logit stem from not knowing the form of the mixing distribution $f(\beta)$, and the need to evaluate numerically the integral (1) and estimate the parameters of $f(\beta)$ by simulated maximum likelihood. The current study assesses the impact of alternative specifications of the mixing distribution and parameter estimation approaches on model performance and stability.

Given the plethora of choices confronting someone wishing to use mixed logit and the contrasting nature of the problems addressed in the discrete choice literature, specific guidance on its application to distress modelling is a contribution of potential interest to academics, regulators and practitioners interested in the

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[1] Refer to Train (2003) for an excellent exposition of mixed logit.

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properties of the bankruptcy modelling approach described in Jones and Hensher (2004).

The current work can also be viewed as part of a more ambitious effort to focus attention on the behavioural insights afforded by applying state-of-the-art discrete choice modelling techniques to bankruptcy prediction.

In particular, HJ advocate a focus on measures of aggregate (population level) fit rather than the prediction of firm level outcomes and they stress the importance of 'understanding the role of specific variables in influencing a specific outcome domain'. Arguments supporting these views are common in Jones and Hensher (2004), Hensher *et al.* (2007) as well as the current study. While these suggestions may well accord with the original intent of discrete choice modelling efforts, I believe there are significant challenges to be met in convincing academics and practitioners that the impact of firm characteristics on the distribution of aggregate default states is of primary concern. The following sections discuss some of these challenges with reference to particular aspects of the current study.

AGGREGATE VS FIRM LEVEL BANKRUPTCY BEHAVIOUR

Continuing in the vein of Jones and Hensher (2004), the current paper documents improvements in model fit and the ability of mixed logit to provide forecasts of group membership (that is, the proportion of firms in each default state) superior to those of a restricted (multinomial logit) benchmark. Using firm level characteristics to model aggregate default behaviour is a novel approach that contrasts markedly with the focus of prior work.

More specifically, the discrimination of firm level performance is the primary focus of interest in both academic and applied (practitioner) research. Representative examples include: Altman (1968), Ohlson (1980), Shumway (2001), Hillegeist *et al.* (2004), Bharath and Shumway (2004) and many others.[2] Interest in the discriminatory properties of bankruptcy models is also reflected in the most commonly used benchmarks of model performance such as the cumulative accuracy profile (CAP), the receiver-operating characteristic (ROC) and the accuracy ratio (AR)—all of which summarize a model's classification performance.[3]

Neither the current study nor Jones and Hensher (2004) provides any indication of whether the superior population level performance of mixed logit specifications is reflective of superior classification performance at firm level. While the overall rate of default is undoubtedly important, the identity of the defaulting entities and the magnitude of the exposures at risk is a crucial determinant of losses. For these reasons, discrimination of firm level performance is of interest for purposes of debt pricing, credit loss provisioning, and capital allocation. Hence, the appeal of techniques such as mixed logit may prove limited until this aspect of model performance is shown to benefit from a more sophisticated approach.

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[2] Refer to Aziz and Dar (2006) for a recent overview of the methodological approaches to corporate bankruptcy prediction and an extensive list of references and the website: www.defaultrisk.com for current work.

[3] Refer to Sobehart *et al.* (2000) for a classification and review of alternative approaches to credit risk model validation and benchmarking. Engelmann *et al.* (2003) provide methods to compute confidence intervals for CAP-, ROC- and AR-type metrics.

Intuition may suggest that a modelling approach which seeks to accommodate heterogeneities in the relation between aggregate bankruptcies and firm level characteristics should yield superior insights about performance at firm level. However, since there is no linkage between the choice of mixing distribution (or random parameter specification) and firm level classification performance, the question needs to be addressed empirically.

AGGREGATE BANKRUPTCY BEHAVIOUR AND FIRM CHARACTERISTICS

It is well recognized that bankruptcies are strongly dependent on macroeconomic conditions and sector specific shocks. Such systematic factors are the primary sources of default dependencies, and most prominent models of credit risk account for these effects either explicitly or implicitly through conditioning on market prices. Schönbucher (2000) provides a useful introduction to the role of systematic factors in modelling default dependencies, and the CreditPortfolioView framework developed by Wilson (1997a, 1997b) is arguably the most prominent model of credit risk that explicitly incorporates macroeconomic variables. CreditPortfolioView serves as an especially interesting point of comparison with the current work, because like the current work, Wilson's approach is focused on modelling aggregate (portfolio level) default outcomes. However, in contrast to the current work, macroeconomic factors are the source of default dependencies.[4]

In applying mixed logit, HJ ignore measures of macroeconomic conditions and choose instead to account for dependencies by accommodating heterogeneity in the mapping of characteristics to aggregate outcomes. While the mixed logit approach is designed to provide information about how individual variations in taste and preferences impact on aggregate outcomes, the reasons for expecting cross-sectional, time invariant idiosyncrasies in the relation between characteristics and bankruptcy are not obvious.[5]

First, as suggested earlier, the empirical links between macroeconomic conditions and the probability of failure are well recognized and empirically documented. Second, to the extent that accounting measures summarize the relevant economic characteristics of an entity, bankruptcy would seem less subject to idiosyncrasies or variations in preferences than purely discretionary decisions.

I note that the latter comment may to some extent reflect an issue of exposition. The current paper builds on the exposition of mixed logit in Jones and Hensher

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[4] The modelling of default rates in CreditPortfolioView is done in the context of simulating a portfolio loss distribution.

[5] Hensher *et al.* (2007) estimate models incorporating macroeconomic variables. However, their results are not directly comparable because they implement a different modelling approach incorporating four unordered outcome states.

(2004), utilizing terminology that is at times difficult to link with the issues pertinent to bankruptcy modelling. Examples include references to: 'unobserved heterogeneity within and between firms', 'firm-specific preferences', 'preference space' and 'utility functions'. While such terminology may be natural in the context of the applications more usually considered in the discrete choice literature, it is at times awkward and almost invariably ambiguous when applied to bankruptcy modelling without specific explanation. For this reason, simple, application-specific illustrative examples of how the form of flexibility afforded by mixed logit may be of benefit in bankruptcy modelling would help potential users better understand the relevance of the framework and the rationale of the modelling choices. Further, with such examples in mind, empirical evidence of mixed logit 'working' becomes more compelling and understandable.

MIXED LOGIT AND BANKRUPTCY MODELLING: COSTS AND BENEFITS

The attractiveness of mixed logit as a modelling framework ultimately depends on the costs and benefits of its application rather than its conceptual attractiveness. In fact, most of the issues discussed to this point can be boiled down to questions of costs and benefits.

On the costs side of the equation, the obvious questions are relatively straightforward but nonetheless important. It would be helpful to know the computational time to complete the simulations required to estimate mixed logit models, the availability of software packages to perform the computations and the level of user sophistication required to estimate and interpret the output of the models.

In terms of benefits, it would be interesting to see the performance of mixed logit estimation relative to less sophisticated econometric approaches (both with and without market information) to understand how much one gains from specifying a logit with a mixing distribution. Given that the sample of firms considered in this study is comprised of publicly traded companies, incorporation of market data is an important consideration. Stated differently, it would be strange for an analyst to go to the trouble of specifying such a sophisticated econometric model while ignoring market data and the macroeconomic environment.

OTHER MODELLING ISSUES

In addition to the more general issues discussed above, the results of the current work serve to raise some specific questions about the application of mixed logit to bankruptcy modelling.

First, the authors state that they assess the performance of the mixed logit model on the basis of four unconditional specifications and a fifth conditional specification of the mixing distribution. However, only the results based on the triangular distribution are reported. Given the focus of the paper, it would have been interesting to know how many specifications were tested, the principles guiding the model choice process and why the reported specification was deemed to be superior to the others. As the authors note, the modelling process is a mixture of art and science; however, given that specification of the random parameters is a 'critical' modelling choice, it would seem important to provide some sources of discipline on the modelling process. In other words, safeguards against specifications that emerge because an analyst manages to find a combination of variables and distributions that appear to produce a good within-sample fit. While specification of the parameter distributions increases flexibility, it may provide an avenue for increasing the usual risks associated with data mining—particularly in the hands of the inexperienced.

Second, further to the previous point, it would be important to know how one proceeds with tests of significance. Specifically, the results provide an example of a variable (total debt to total equity) that can (in Table 1) be seen to have an insignificant mean but a significant standard deviation, and later, an economically anomalous (but statistically insignificant) marginal effect. Unfortunately the net implication of these findings is not made clear. While the statistically significant standard deviation implies significant 'unobserved heterogeneity', what does one make of the role of leverage in bankruptcy risk given the apparent non-significance of the other findings? The answers to these questions are important given that the stated objective of mixed logit modelling is to 'understand the role of specific variables', and measures of leverage are central to most models of financial distress risk.

It is possible that the results pertaining to leverage are driven by the choice of random parameter distribution, and this again raises the question of modelling strategy and how to specify both the variables that enter the model and their assumed distribution. It also raises the question of the appropriate focus of interest: Is inclusion of variables determined by their significance in the model (Table 1) or the significance of their marginal effect (Table 3)? In my view, an application-specific guide to these modelling choices would be a useful supplement to the authors' current work.

Third, aside from the statement that they are 'following standard practice in the literature', the authors do not provide an explanation of why they exclude from the estimation sample firms that failed during the validation sample. The stated justification is a little odd, given that much of their work is highly critical of 'standard practice in the literature' in general, and the impact of choice-based sampling on modelling results is one specific focus of the current work. For this reason, failure to report the impact of this particular choice on their sample size and modelling results is a notable omission.

Finally, I believe it is important to emphasize that the 'accuracy rates' reported with reference to Table 2 are ratios of predicted proportions in each category to actual (outcome) proportions in each category. In contrast to what's usually reported in the literature, these ratios do not reflect the classification performance of mixed logit.

SUMMARY AND SUGGESTIONS

Hensher and Jones discuss the over-simplifications inherent in less sophisticated models of discrete choice and contribute to the literature by highlighting the impact of mixed logit modelling choices on the prediction of aggregate default state outcomes. They also suggest that Zmijewski's (1984) conclusions about the sensitivity of population level distribution estimates to sample selection bias appear generalizable to a multi-outcome setting.

In discussing this paper I highlighted several issues that are likely to be of importance to potential users of mixed logit in bankruptcy modelling applications. In particular, the authors' comments notwithstanding, both the extant literature focus and the applications of interest to practitioners strongly suggest the importance of exploring whether the added flexibility afforded by the framework provides for improved firm level classification performance.

Since one way of motivating mixed logit is through the restrictive assumptions about the independence of errors in simpler models, the value of mixed logit would be important to assess relative to simpler modelling frameworks that incorporate variables which are expected to account for such violations—namely market variables and macroeconomic variables.

Interesting avenues for future research may include the evaluation of mixed logit in a context where market variables are unavailable, namely, the modelling of private firm exposures. This would be an especially important context for the form of 'out of universe' evaluations suggested in Sobehart *et al.* (2000).

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ANDREAS CHARITOU, NEOPHYTOS LAMBERTIDES AND
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Earnings Behaviour of Financially Distressed Firms: The Role of Institutional Ownership

Using a sample of 859 U.S. bankruptcy-filing firms over the period 1986–2004, we examine the earnings behaviour of managers during the distressed period by looking at sources of abnormal accruals prior to the bankruptcy-filing year. Results show that managers of highly distressed firms shift earnings downwards prior to the bankruptcy filing. We test and provide evidence in support of two potential contributing factors. First, top-level management turnover among distressed firms leads new managers to earnings bath choices during the distressed period. Second, qualified audit opinions exert pressure on managers to follow more conservative earnings behaviour during the distressed period. Evidence is also provided that the management of distressed firms with lower (higher) institutional ownership has greater (lesser) tendency to manage earnings downwards. Results also show that higher institutional ownership mitigates the negative abnormal returns of firms with top management turnover. To the authors' knowledge, this is the first study that attempts to examine whether institutional ownership relates to market reaction in conjunction with a top management turnover or a qualified audit opinion during the distressed period. Prior studies focused on the investigation of earnings management or institutional ownership (separately) during the distressed period, but did not examine if the effect of institutional ownership on earnings behaviour also influences subsequent returns. Thus, the results of this study should be of interest to analysts, standard setters and regulatory bodies since our results show that management turnover, qualified audit opinions and firm governance mechanisms affect the quality of earnings and the level of abnormal returns.

Key words: Abnormal returns; Audit opinions; Distress; Earnings management; Institutional ownership; Management turnover.

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The economic and social costs of corporate failure are substantial. Recent evidence shows that the market value of distressed firms declines substantially. Hence, the suppliers of capital, investors and creditors, as well as management and employees are severely affected by business failure.[1] Equity investors and creditors may lose their investment, while management and employees may lose their jobs. The threat of a dramatic drop in the firm's market value may cause management to be apprehensive. Prior studies suggest that the management of firms in distress may have various incentives or feel pressure to manage financial information in different ways. The literature provides mixed results with regard to the earnings behaviour of distressed firms. Some studies find that the management of financially distressed firms adjusts earnings upwards (DeFond and Jiambalvo, 1994; Rosner, 2003; Beneish *et al.*, 2004) while other studies show that the earnings of such firms are shifted downwards (DeAngelo *et al.*, 1994).

Instinctively one would expect upward earnings behaviour among highly distressed firms. There are at least two main potential explanations for this. First, management of distressed firms has motivation (acting on behalf of shareholders or institutional investors) to report higher earnings in order to avoid debt covenant violations and probable bankruptcy. In such cases managers are primarily concerned with the short-term survival of their firm (which does not necessarily imply self-interested manipulation). For instance, DeFond and Jiambalvo (1994) show positive unexpected accruals in the year prior to default, consistent with managers manipulating earnings to prevent default. Dichev and Skinner (2002) also provide evidence that managers take actions to avoid debt covenant violations. An alternative explanation is that management of financially distressed firms may manipulate earnings upwards out of self-interest for various reasons, such as to avoid management turnover during the distressed period, or temporarily inflate the market price to increase their compensation or gain from cashing stock-based compensation holdings. Bergstresser and Philippon (2006) investigate the relationship between CEO incentives and earnings management and find that more 'incentivized' CEOs—those whose overall compensation is more sensitive to company share prices—lead to higher levels of earnings management.

A number of hypotheses have also been proposed supporting the opposite earnings behaviour. First, earnings-decreasing behaviour may be chosen by *new* management following management change (turnover), as part of a wider strategy to blame the 'old' management for the distressed firm condition (DeAngelo *et al.*, 1994; DeFond and Jiambalvo, 1994). DeFond and Jiambalvo find that 29 per cent of the firms with debt covenant violations had management changes in the year of violation. Although they show income-increasing behaviour in the year of violation, after they eliminate firms with management changes (or audit going-concern qualifications), abnormal total accruals are positive but not significantly different from zero. Moreover, DeAngelo *et al.* find that about 46 per cent of their sample firms had top management change, suggesting that earnings-decreasing behaviour may be associated (positively) with management turnover. Second, earnings-decreasing behaviour may be chosen by (existing) managers acting in self-interest to reduce temporarily the market price such as to increase their own gain from a subsequent management buyout (Perry and Williams, 1994). Third, management of distressed firms may engage in earnings-decreasing behaviour and implement more conservative accounting practices prior to bankruptcy filing to reduce exposure to litigation (a result of prudent practice, not manipulation). These more conservative accounting practices adopted during the distress period may be either chosen voluntarily by managers (acting on behalf of shareholders) or may be the result of pressure imposed by auditors or by lenders (a result of increased scrutiny as the degree of financial distress increases). Rosner (2003) compared nongoing-concern years with going-concern years for bankrupt firms and found significantly lower magnitudes for receivables, inventories, net property, plant and equipment, sales, gross profit, working capital, current and total accruals in going-concern years, consistent with overstatement reversals. Moreover, lenders may also practise more careful monitoring towards financially troubled firms. By attempting to increase reported earnings, managers may risk loosing credibility with lenders, thereby endangering important financial resources at crucial times. Fourth, management may lower earnings in an effort to obtain concessions from various parties for long-term firm survival, for example, extracting wage concessions from unions/employees or dividend reductions from shareholders (DeAngelo *et al.*, 1994), not necessarily due to self-interested manipulation. Finally, earnings decreases may naturally result from decreases in certain short-term accruals (e.g., accounts receivable, accounts payable, inventory) or from write downs (affecting long-term accruals, such as property, plant and equipment) under proper application of GAAP impairment standards as a result of declining economic performance (not implying manipulation).

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[1] For recent work on bankruptcy and financial distress see Beaver *et al.* (2005), Hillegeist *et al.* (2004), Leland (2004), and Altman (2001, 1999), among others.

To sum up, from the aforementioned discussion, evidence shows that there exist many motives that, depending on firm-specific circumstances, may lead managers to adopt either earnings-increasing or earnings-decreasing behaviour. A number of motives reflect deliberate choices on the part of managers, in some cases acting on behalf of shareholders (not necessarily implying self-interested manipulation), while in other cases motives may be driven by managers' self-interest (implying manipulation). Some motives are the result of pressure or intervention on the part of other parties, such as auditors or lenders. Other motives are simply the result of natural changes in accruals as a result of declining economic performance (no manipulation).

It is therefore of interest to examine how managers of highly-distressed firms behave during distress periods and which set of the proposed hypotheses or causes may drive that behaviour. We investigate how management turnover, qualified audit opinions and institutional ownership may affect managers' earnings behaviour of distressed firms. We generally find that managers of distressed firms follow practices that lead to lower earnings. In order to shed more light on possible causes for shifting earnings downward during the distress period, we investigate in more depth the management turnover and audit opinion arguments. Regarding the management turnover hypothesis, we examine the tendency of *new* managers of financially distressed firms to behave differently than the management of non-distressed firms. Lower earnings may be blamed on prior management so that future income can be relieved such that an improved future earnings performance can be reported (Gilson, 1989; DeFond and Jiambalvo, 1994). Our second test investigates the impact of *qualified* audit opinions on managers' earnings behaviour, namely whether auditors exert pressure on managers of distressed firms to be more conservative in their financial reporting practices since firms receiving qualified audit opinions are likely to be under more intense public scrutiny.

Also tested is whether institutional investors influence managers' earnings behaviour (by mitigating observed abnormal earnings behaviour), possibly by being more effectively involved in managerial decisions when firms are under distress. The role of institutional investors in corporate governance, and the resultant effects of their involvement in portfolio firms, has been a subject of popular debate in recent years (Bushee, 1998; Agrawal and Chadha, 2005; Ajinkya, 2006; Dechun, 2006). Many critics, such as Bhide (1993) and Porter (1992), allege that the frequent trading and fragmented ownership by institutional investors discourage such investors from becoming actively involved in the corporate governance of their portfolio firms and encourage myopic behaviour by portfolio firm managers. Similarly, Black (1998) disputes claims that there is an increasing trend in institutional activism in the U.S. that has brought about improvements in the shareholder wealth of the portfolio firms (Smith, 1996). Conversely, other studies provide evidence suggesting that institutional investors are playing an active role in monitoring and disciplining managerial discretion, as well as improving information efficiency in the capital markets (Bushee, 1998; El-Gazzar, 1998). Consistent with prior studies that identify investor protection as a key institutional factor affecting corporate policy choices (Shleifer and Vishny, 1997; La Porta *et al.*, 2000; Leuz *et al.*, 2003), the focus here is on institutional ownership as a significant mechanism determining earnings management activity. By aligning the effects of an investor protection mechanism with institutional ownership on the quality of firm earnings, we expect that a higher percentage of institutional ownership will exert a more effective monitoring role on the firm's management. Institutional investors are generally adversely affected by lower (downward) earnings behaviour for several reasons. First, downward earnings behaviour may adversely affect share prices and the market value of their shareholdings. It may also increase the chance of the firm violating some covenant and filing for bankruptcy, in which case institutional investors may suffer substantial losses. For these reasons, institutional investors of distressed firms have incentives to mitigate earnings-decreasing (accruals) behaviour whether due to management turnover or to conservatism imposed by auditors.

Finally, in order to understand better the influence of institutional investors on managers' ability (through their accruals behaviour) to control returns, we examine whether institutional ownership affects subsequent abnormal returns (a) for firms with top management turnover and (b) for firms with qualified audit opinion during the distressed period. Thus, if managers do not recognize that the earnings underperformance is discretionary, they may overvalue the firm and consequently reduce subsequent returns. To the authors' knowledge, this is the first study that attempts to examine whether institutional ownership relates to market reaction in conjunction with a top management turnover or a qualified audit opinion during the distressed period. Prior studies focused on the investigation of earnings management or institutional ownership (separately) during the distressed period, but did not examine if the effect of institutional ownership on earnings bahaviour also influences subsequent returns. The results here should be of interest to managers, shareholders and institutional investors since there is evidence that links institutional ownership and management turnover (or audit opinion) with subsequent performance.

The current study differs from prior work in several respects. First, it investigates managers' earnings behaviour of highly distressed firms that filed for bankruptcy, rather than firms with persistent losses or dividend reductions (DeAngelo *et al.*, 1994; DeFond and Jiambalvo, 1994). Second, it tests for two potential causes for unusual earnings behaviour: (a) earnings behaviour decreases attributed to *new* managers prior to the bankruptcy-filing year, and (b) more conservative earnings reporting practices by firms involved with qualified audit opinions, shedding light on whether auditors exert conservative pressure on distressed firms. Third, it examines the role of institutional investors in potentially mitigating earnings behaviour during the distressed period. Although previously the institutional ownership dimension is well examined for various groups of firms (e.g., Shleifer and Vishny, 1997; Denis and McConnell, 2003), prior research has not focused directly on the monitoring role of institutional ownership on the earnings behaviour of firms in financial distress. Finally, it examines the ability of institutional ownership to mitigate subsequent firm underperformance when (a) top management turnover takes place, or (b) firms get qualified audit opinions during the distressed period, by considering the relation between institutional ownership and abnormal returns for each one of the above two events.

SAMPLE AND METHODOLOGY

Sample Selection

The dataset comprises 859 U.S. (SEC-registered) firms that filed for bankruptcy during the period 1986–2004 and one control sub-sample of healthy firms (matched by year-industry-ROA). Our initial sample consisted of 1,258 U.S. bankruptcy-filing firms. To be included in the final sample, firms must have had data available in the Compustat database and been identified in the *Wall Street Journal* or in the *Internet Bankruptcy Library* as having filed a Chapter 11 bankruptcy petition. Following standard practice, financial institutions and utility firms (SIC 6000-6999) were removed from the sample.[2]

[2] Firms in these industries may be structurally different, face a different regulatory and bankruptcy environment, and their cash flow characteristics may differ from those of other firms.

The 859 bankruptcy-filing firms were matched with the same number of healthy (non-bankruptcy-filing) firms having the following characteristics: firms must be from the same industry having similar return on asset performance three years prior to bankruptcy filing.[3] We use the term 'performance matched' to refer to this sample. Jones (1991) cautions that the financial information available for distressed firms close to the filing of bankruptcy should be handled with care. The audit process for such distressed firms can be particularly time-consuming and the annual reports prepared just prior to bankruptcy filing may become available only after the bankruptcy filing.[4] To be included in the sample, firms must have available audit opinion and corporate governance information (percentage of institutional ownership and number of institutions) for the three-year period prior to the event of bankruptcy filing in the Compact D SEC Disclosure database. To examine managerial turnover, we searched the *WSJ Index* to find if there was a change in the position of the president, the chief executive officer or the chairman of the board during the three-year period prior to the bankruptcy filing.

Table 1 reports the characteristics of the 859 U.S. bankruptcy-filing firms in our final dataset. Panel A reports the distribution of bankruptcy-filing firms by industry. The retail industry comprises 9.2 per cent while computer equipment and services comprises 18.98 per cent of total bankruptcy filings, suggesting the high riskiness of these sectors. Panel B shows the time distribution of the bankruptcy filing event for the sample firms. Many bankruptcy filings are clustered around 1996 to 2004. These years contain more than 72 per cent of the sample firms that filed for bankruptcy. Specifically, during the internet bubble 2000–01 period the bankruptcies are almost 28 per cent of our sample. However, untabulated results verify that these firm-years do not bias our main results. Panel C reports sample characteristics for the distressed firms three years prior to bankruptcy. The mean total book values of assets and firm size are $748 million and $10.4 million, respectively. These measures vary considerably, as evidenced by their large standard deviation. Mean and median ROA and sales growth are negative, confirming the low financial performance of these distressed firms. Panel D

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[3] Similar return on asset prior to bankruptcy filing means that the matched healthy firm is the one having the *minimum* absolute ROA difference with the bankrupt firm in year –3 prior to bankruptcy filing, using the following formula: $Dif = |ROAb_{-3} - ROAh_{-3}|$, where $ROAb_{-3}$ ($ROAh_{-3}$) corresponds to the return on assets of the bankrupt (healthy) firm the third year prior to the bankruptcy filing. Matched healthy firms did not file for bankruptcy in the subsequent three years. Our matching procedure is consistent with prior related research studies. According to Damodaran (2001), a comparable firm is one with cash flows, growth potential, and risk characteristics similar to the firm of interest. In practice, the most typical method of matching firms is by industry and size, which is appropriate when there are a number of firms in a sector (as in the U.S. market). However, consistent with Kothari *et al.* (2005) distressed firms may be better compared with matched firms based on their return on assets. Our results were qualitatively similar when we used a sub-sample of control healthy firms matched by year, industry and total assets.

[4] As per Jones (1991), there exist two problems when using financial data from the financial statements during the bankruptcy year: First, data may contain adjustments made by the auditor in light of the bankruptcy filing; second, the data would not normally be available in a practical application of the model.

TABLE 1

CHARACTERISTICS OF 859 U.S. BANKRUPTCY-FILING FIRMS, 1986–2004

Panel A: SIC distribution

Industry	Codes	Freq.	%
Oil and Gas	13	20	2.33
Food products	20	16	1.86
Paper and paper products	24,25,27	14	1.63
Chemical products	28	26	3.03
Manufacturing	30–34	48	5.59
Computer equipment and services	35,73	163	18.98
Electronic equipment	36	67	7.80
Transportation	37,39,42,45	62	7.22
Scientific industries	38	25	2.91
Durable goods	50	37	4.31
Retail	53,54,56,57,59	79	9.20
Eating and drinking establishments	58	24	2.79
Entertainment services	70,78,79	12	1.40
All others	12,15,17,22,23,29,51,52,55,72,75,82,83,99	266	30.97
		859	100

Panel B: Time distribution

Year	Freq.	%	Cum. Freq.	%
1986–1990	97	11.29%	97	11.29
1991–1995	142	16.53%	239	27.82
1996–2000	281	32.71%	520	60.54
2001–2004	339	39.46%	859	100

Panel C: Sample characteristics

	ROA	Size	Total assets	Sales growth
Mean	−0.381	10.472	748.702	0.288
Median	−0.029	9.490	124.606	0.059
Std dev.	0.323	3.473	50.224	0.258

Panel D: Sample characteristics for 2000–01 years (internet bubble)

	ROA	Size	Total assets	Sales growth
Mean	−0.286	4.291	645.019	0.498
Median	−0.010	4.826	248.651	0.122
Std dev.	0.222	2.782	41.258	0.332

Note: Sample characteristics are measured in millions of dollars. These variables are obtained three years prior to bankruptcy filing year.

reports sample characteristics for the distressed firms that filed for bankruptcy during the internet bubble 2000–01 period. Results show that these firms are smaller and have superior performance than the entire sample.

Earnings Management (Accrual) Models

Following Teoh *et al.* (1998), accruals are decomposed into four categories by time period (current and long-term) and manager control (discretionary and non-discretionary). The decomposition of accruals into these four categories allows for better analysis of the source of earnings management and provides a better understanding of the components of accruals that can be managed and the underlying incentives of managerial behaviour.

The first category, current accruals, are adjustments involving short-term assets and liabilities that support the day-to-day operations of the firm. Managers can alter current accruals, for example, by advancing recognition of revenues with credit sales (before cash is received), by delaying recognition of expenses after cash is advanced to suppliers, or by assuming a low provision of bad debts. Long-term accruals are adjustments involving long-term net assets. These accruals can be altered by decelerating depreciation, decreasing deferred taxes, or realizing unusual gains (Teoh *et al.*, 1998).

Although accruals can be observed, it is very difficult for investors to identify which portion of accruals is being managed. Given industry-related and firm-specific business conditions, some accrual adjustments are necessary and would be expected by investors. This category of accruals is defined as non-discretionary. For example, asset-intensive firms are expected to have high depreciation, while rapidly growing firms are expected to have revenues that exceed cash sales. To extract the non-discretionary accruals that are dictated by firm conditions and are independent of managerial manipulation, a cross-sectional adaptation of the modified Jones (1991) model is used (see Teoh *et al.*, 1998). The accruals are regressed on the change in sales in a cross-sectional regression using all (bankrupt and healthy) firms in the same two-digit SIC code as the bankruptcy-filing firm. The cross-sectional regression is performed for each fiscal year, and all variables are scaled by beginning-of-the-year firm assets. After adjusting sales growth for the increase in accounts receivables, the bankruptcy-filing firm's fitted current accruals level is considered typical in the industry for that level of sales growth. The fitted current accruals level found is the non-discretionary current accruals level (NDCA). Since the remaining current accruals are not dictated by firm conditions but are rather managed, they are termed discretionary current accruals (DCA).

To decompose long-term accruals, an equivalent procedure is applied. First, total accruals are decomposed into a discretionary and a non-discretionary component based on sales growth and property, plant and equipment (adjusting for depreciation). The difference between discretionary total accruals and discretionary current accruals are the discretionary long-term accruals (DLA). The difference between non-discretionary total accruals and non-discretionary current accruals are non-discretionary long-term accruals (NDLA). The cross-sectional approach automatically adjusts for changing industry-wide economic conditions which might influence accruals independently of earnings management.[5]

Kothari *et al.* (2005) suggest that discretionary accrual models may be misspecified when applied to firms with extreme past performance, proposing that a matching procedure based on performance (ROA) is more appropriate for these firms. Consistent with Kothari *et al.* (2005), we implement an alternative accruals model, the 'performance-matched' discretionary accrual model. These accruals are calculated as the difference between the accruals (discretionary, non-discretionary, current or long-term) of the bankruptcy-filing firm and the corresponding accruals of a matched healthy firm (matched by two-digit SIC code and ROA).

EMPIRICAL RESULTS

This section presents our empirical findings on the earnings behaviour of distressed firms. Separate subsections below discuss the following aspects: (a) the earnings, cash flow and accruals time-series performance for the event year and for the three years prior to bankruptcy filing, (b) the role of management turnover in subsequent earnings decreasing accounting choices during the distressed period (the years prior to bankruptcy filing), (c) the role of audit opinions on earnings behaviour during the distressed period (the years prior to bankruptcy filing), and (d) the role of institutional investors in mitigating abnormal earnings reporting.

Time-Series Behaviour of Earnings, Cash Flows, and Accruals Prior to Bankruptcy Filing

Table 2 presents the time-series profile of asset-scaled net income (NI) and cash flow from operations (CF) from year –3 to 0 relative to the event of bankruptcy filing (base year 0). Two measures of performance are presented. The first is the level of the accounting variables, NI and CF, scaled by prior-year total assets (TA_{t-1}). The second measure is the bankrupt firm's asset-scaled accounting variable, minus that of a matched non-bankruptcy-filing firm. The matched firm comes from the same industry with a similar return on assets ratio as the bankruptcy-filing firm three years prior to bankruptcy. This analysis is performed in order to examine the behaviour of earnings and cash flows in the years prior to bankruptcy filing. Consistent with expectations, the results show large net income underperformance in the years prior to bankruptcy filing. Specifically, there is a significant decline in the earnings and cash flow performance measures during the years prior to bankruptcy filing, especially during the year –1. The significant decrease in earnings and cash flows exists three years prior to the bankruptcy filing and holds till the year of bankruptcy filing. The median net income (and cash flow) measure is lowest one year prior to bankruptcy filing. Comparing the medians for each measure of the two accounting variables, NI and CF, the behaviour of cash flows appears to be more stable. The aforementioned results were reconfirmed when we used differences in earnings and cash flows instead of levels (see Table 2,

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[5] For a detailed description of this model see Appendix A in Teoh *et al.* (1998).

Table 2

NET INCOME AND CASH FLOW

Year	−3	−2	−1	0	Year	−3	−2	−1	0
Panel A: Net income performance									
A1. Bankruptcy-filing unadjusted net income: NI/TA$_{t-1}$					A2. Net income of bankruptcy-filing firm minus net income of performance matched firm				
Mean	−0.388	−0.438	−0.810	−0.345	Mean	−0.236	−0.224	−0.587	−0.217
p-value	(0.000)	(0.000)	(0.000)	(0.000)	*p*-value	(0.000)	(0.000)	(0.000)	(0.000)
Median	−0.032	−0.112	−0.234	−0.236	Median	−0.019	−0.047	−0.116	−0.137
p-value (Wilc.)	(0.000)	(0.000)	(0.000)	(0.000)	*p*-value (Wilc.)	(0.000)	(0.000)	(0.000)	(0.000)
N	737	799	602	208	*N*	686	757	582	187
Panel B: Cash flow from operations									
B1. Bankruptcy-filing unadjusted cash flow: CF/TA$_{t-1}$					B2. Cash flow of bankruptcy-filing firm minus cash flow of performance matched firm				
Mean	−0.189	−0.240	−0.248	−0.001	Mean	−0.137	−0.185	−0.179	0.004
p-value	(0.006)	(0.000)	(0.000)	(0.982)	*p*-value	(0.000)	(0.000)	(0.000)	(0.849)
Median	−0.004	−0.027	−0.045	0.028	Median	−0.029	−0.057	−0.060	−0.003
p-value (Wilc.)	(0.000)	(0.000)	(0.000)	(0.002)	*p*-value (Wilc.)	(0.000)	(0.000)	(0.000)	(0.346)
N	728	786	592	205	*N*	653	720	559	180

This table presents two measures of performance for two accounting variables, net income (*NI*) in Panel A and cash flow from operations (*CF*) in Panel B from year −3 to 0. In Panels A1 and B1, the two accounting variables are scaled by the prior year's total assets. In Panel A2, the performance measure is the bankruptcy-filing firm's *NI* (scaled by previous year total assets) minus that of a performance matched firm. In Panel B2, the performance measure is calculated the same way as in Panel A1, except we replaced *NI* with *CF*.

p-values represent statistical significance using *t*-test for the mean and Wilcoxon-test for the median that the variable is different from zero.

TABLE 3

TOTAL ACCRUALS

Year	−3	−2	−1	0	Year	−3	−2	−1	0
Total accruals (TAC)					Total accruals changes (ΔTAC)				
Mean	−0.203	−0.183	−0.499	−0.432	Mean	−0.083	0.067	−0.124	0.476
p-value	(0.000)	(0.000)	(0.000)	(0.000)	*p*-value	(0.296)	(0.151)	(0.001)	(0.485)
Median	−0.070	−0.091	−0.172	−0.272	Median	−0.020	−0.014	−0.101	−0.109
p-value	(0.000)	(0.000)	(0.000)	(0.000)	*p*-value	(0.001)	(0.031)	(0.000)	(0.000)
Std dev.	0.110	0.103	0.458	0.081	Std dev.	0.198	0.122	0.112	0.823
N	728	759	526	155	*N*	624	684	494	146

This table presents total accruals (TAC) and changes in total accruals (ΔTAC) of bankruptcy filing firms for the years −3 to 0 relative to the event of bankruptcy filing. Total accruals are standardized by beginning-of-period total assets.
p-values represent statistical significance using *t*-test for the mean and Wilcoxon-test for the median that the variable is different from zero.

Panels A2 and B2).[6] The results presented thus far lead us to investigate further possible management of accruals by financially distressed firms prior to the bankruptcy filing event.[7]

Table 3 presents total accruals (TAC) and changes in total accruals (ΔTAC) from year −3 to 0 relative to the event of bankruptcy filing. Results show a significant decrease in total accruals from −0.07 in year −3 to −0.27 the last year (year 0) prior to bankruptcy filing. Similar decline is shown when using changes in total accruals (ΔTAC). These results suggest that distressed firms experience large decreases in total accruals as bankruptcy filing approaches. The negative total accruals indicate income decreasing behaviour, portraying the serious financial

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[6] The sample size changes as we approach bankruptcy since some new firms are included in the sample tested or due to unavailability of financial data. Results are presented in this way to avoid any sample selection bias by keeping in the sample only more established firms with available data in the last three years prior to the bankruptcy filing, thus excluding firms with only one or two years of data, which may be newer firms with different characteristics or incentives than the more established bankrupt firms. Moreover, the difference in the number of observations between earnings and cash flows is totally due to the unavailability of some financial data in the Compustat Database. For example, it is possible for a firm to have available data for net income (NI) but not for operating cash flows (OANCF) for a specific year. Furthermore, since prior to the year 1987 cash flow data were not available, we estimated operating cash flows (see formula used in Teoh *et al.*, 1998). The aforementioned issue is mitigated since in all subsequent tables, in order for a firm to be included in the sample, it must have available data for both earnings and cash flows.

[7] DeAngelo *et al.* (1994) show that troubled firms have large negative accruals in the years prior to the event year, but it is not obvious which accrual component—current or long-term—generates these negative amounts. According to Teoh *et al.* (1998), managers more easily manipulate current accruals than long-term accruals. Based on these results and given that the bankruptcy filing firms can be viewed as a subset of the DeAngelo *et al.* distressed set, we expect the bankruptcy filing firms to exhibit large negative total accruals, dominated primarily by current accruals.

Table 4

DISCRETIONARY ACCRUAL CHANGES

Year	–3	–2	–1	0	Year	–3	–2	–1	0
Performance-matched discretionary current accruals (DCA)					Performance-matched discretionary long-term accruals (DLA)				
Mean	−0.016	−0.041	−0.001	−0.025	Mean	−0.124	0.051	−0.227	−0.100
p-value	(0.651)	(0.066)	(0.969)	(0.600)	*p*-value	(0.172)	(0.540)	(0.000)	(0.504)
Median	−0.004	−0.001	−0.003	0.024	Median	0.005	−0.005	−0.140	−0.046
p-value (Wilc.)	(0.647)	(0.432)	(0.067)	(0.277)	*p*-value (Wilc.)	(0.990)	(0.859)	(0.011)	(0.231)
Std dev.	0.783	0.523	0.613	0.578	Std dev.	1.904	1.884	3.171	1.700
N	483	565	461	144	*N*	440	518	421	129

This table presents discretionary current and long-term accruals changes for the years –3 to 0, for bankruptcy filing firms. This table shows the performance-matched discretionary accrual measures suggested by Kothari *et al.* (2005), expressed as abnormal accruals. The abnormal discretionary current accruals are calculated as the industry modified Jones model discretionary current accruals of the bankruptcy-filing firm minus the industry modified Jones model discretionary current accruals of the matched firm. The matched firm belongs to the same industry and has similar return on assets performance as the bankrupt firm three years prior to bankruptcy filing.

p-values represent statistical significance using *t*-test for the mean and Wilcoxon-test for the median that the variable is different from zero.

problems of the sample firms. However, whether this large decrease in median total accruals, especially during the years –1 and 0 prior to bankruptcy filing, is discretionary or not, it cannot be determined by total accruals. The use of a more sophisticated discretionary accrual model is absolutely necessary.

Table 4 reports the time-series distribution of the *changes* in discretionary current and long-term accrual measures from year –3 to 0 relative to the event of bankruptcy filing based on the performance-matched accrual model.[8] Results show that discretionary current (DCA) and long-term (DLA) accrual changes are significantly negative one year prior to bankruptcy filing. Moreover, it seems that DLA changes are significantly negative in the last year of bankruptcy (year 0), while DCA changes are positive in this year. These results confirm results of prior studies that found that significant earnings management may take place prior to bankruptcy filing, manifested in both current and long-term accruals. The net effect results in a significant drop in total discretionary accruals, which is consistent with the significant decline in net income observed during the year prior to bankruptcy filing. DCA changes drop to –0.003 in year –1 (from –0.001 in year –2), whereas discretionary DLA changes drop to –0.140 in year 1 (from –0.005 in

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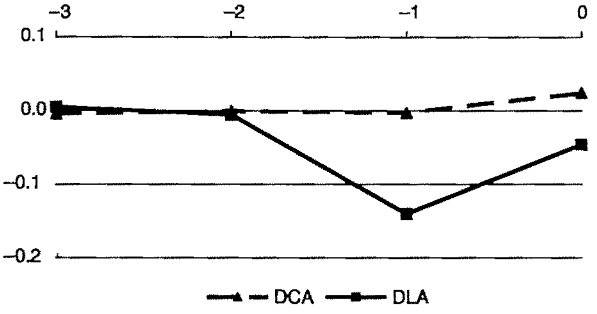
[8] Table 4 presents *changes* in accruals rather than levels to address possible measurement error problems since the matching procedure focuses only on performance levels.

FIGURE 1

MEDIAN ABNORMAL ACCRUALS (PERFORMANCE-MATCHED DISCRETIONARY ACCRUALS)



year 2). The drop is significant at the 0.1 and 0.05 levels, respectively, confirming the presence of accruals management in the reported earnings.[9] Figure 1 shows graphically the median discretionary current and long-term accruals changes over time.[10]

The above findings suggest that discretionary current and long-term accruals are significantly low one year prior to the bankruptcy filing year. These results are consistent with the hypothesis that bankruptcy-filing firms experience a decrease in their total accruals prior to bankruptcy filing associated with changes in these accrual components.

Management Turnover

This section presents findings on the management turnover hypothesis that managers of distressed firms may deliberately decrease reported earnings, blaming prior management for the low current earnings performance. As future earnings rebound, an improved earnings trend can then be reported. For example, DeFond and Jiambalvo (1994) examined whether management changes relate to debt covenant violation and find that 29 per cent of the firms with debt covenant violations had management changes in the year of violation. Importantly, although they show income-increasing behaviour the year of violation, after they eliminated firms with management changes, abnormal total accruals were not significantly different from zero. These results suggest that new managers initially decrease earnings deliberately and thereafter manage earnings upwards to earn higher bonuses. Based on the aforementioned discussion, we expect firms that had management changes prior to bankruptcy filing will exhibit less negative abnormal accruals. To determine management turnover in the sampled firms, we examined the *WSJ Index* for three years prior to bankruptcy filing. Panel A of Table 5 reports the incidence of management changes within the bankruptcy-filing and healthy (control matched) samples and the comparative subsequent discretionary accruals of the two groups. Evidence is adduced of senior management changes (in the chairman, chief executive officer, and/or president positions) at 129 (15 per cent) and 151 (18 per cent) distressed firms two and one years prior to bankruptcy filing, respectively, in contrast to 80 (9 per cent) and 82 (9 per cent) for the matched healthy firms. Results in Panel B suggest that management changes may affect subsequent earnings choices. As expected, the distressed firms exhibit lower discretionary current accruals than the control healthy group in year –1, and lower discretionary long-term accruals in years –1 and 0. The findings are consistent with the management turnover hypothesis.[11] The low discretionary accruals during the distressed period may be partly attributed to the high incidence of management turnover.

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[9] These results are consistent with DeAngelo *et al.* (1994) since they show significant negative long-term discretionary accruals. DeAngelo *et al.* considered the large negative write-offs of their troubled firms to be discretionary.

[10] The accrual measures in Table 4 were re-estimated in order to analyse accrual levels rather than changes. Moreover, the results in Table 4 were re-estimated using the unmatched discretionary accrual model suggested by Teoh *et al.* (1998). These results were qualitatively similar to those presented in Table 4. These results are available upon request.

Audit Opinions

Another plausible explanation for earnings-decreasing choices is the conservative accounting practices induced by qualified audit opinions during the distress period. If the clients' financial reporting practices are more conservative, auditors face a lower chance of being sued in the event that their clients file for bankruptcy. DeFond and Jiambalvo (1994) found that 26 per cent of the violation firms had going concern qualifications in the year of violation and their accruals were 'abnormally' low. Similarly, Rosner (2003) found significant income-decreasing behaviour in going-concern years, which she interprets as overstatement reversals. DeAngelo *et al.* (1994) found that only two firms received a modified audit opinion in their sample. Consistent with these findings, we aim to show that firms with qualified audit options exhibit more negative subsequent abnormal accruals. Table 6 reports the incidence of modified audit opinions within the distressed and healthy control (matched) samples and the comparative discretionary accruals of the two groups. Of the 859 distressed firms, 349 (40 per cent) received a modified audit opinion two years prior to bankruptcy filing and 695 (80 per cent) in the last year alone. These numbers are significantly different for healthy firms. Only 303 (35 per cent) and 367 (42 per cent) of the matched healthy firms received a modified audit opinion during the corresponding years. Results in Panel B of

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[11] Gilson (1989) found that 52 per cent of troubled firms experience turnover in senior management. New managers are known to take an earnings bath (Moore, 1973; DeAngelo, 1988) which can be manifested in reduced accruals probably by writing down or writing off assets and increasing provisions for future costs or losses. DeFond and Jiambalvo (1994) found that 29 per cent of the firms with covenant violations had management changes in the year of violation, probably explaining earnings-decreasing choices.

TABLE 5

MANAGEMENT CHANGES

Panel A: Management change (turnover)

Year	−3	−2	−1	Total (years −3, −2, −1)
Distressed	66 (7%)	129 (15%)	151 (18%)	326 (40%)
Performance matched	57 (6%)	80 (9%)	82 (9%)	219 (25%)
p-value	(0.905)	(0.000)	(0.000)	(0.000)

Panel B: Management change at −2

	DCA					DLA			
Year	−3	−2	−1	0	Year	−3	−2	−1	0
Distressed	0.0045	0.0273	−0.0331	0.1016	Distressed	0.0245	0.0043	−0.0416	−0.2359
Performance matched	−0.0122	0.0203	−0.0184	0.0149	Perf. matched	0.0178	0.0193	0.0380	−0.0079
p-value	(0.865)	(0.821)	(0.068)	(0.018)	*p*-value	(0.558)	(0.622)	(0.047)	(0.000)

Panel C: Management change at −1

	DCA					DLA			
Year	−3	−2	−1	0	Year	−3	−2	−1	0
Distressed	0.0032	0.0093	−0.0271	0.0681	Distressed	0.003	−0.0087	−0.0360	−0.1382
Performance matched	0.0024	−0.0195	−0.0097	0.0128	Perf. matched	0.002	0.0037	−0.0195	−0.0170
p-value	(0.987)	(0.141)	(0.059)	(0.007)	*p*-value	(0.546)	(0.753)	(0.065)	(0.055)

This table presents the frequency of management changes up to three years prior to bankruptcy filing. For each category the table presents the median discretionary current accruals (DCA) and the discretionary long-term accruals (DLA) for years −3 to 0 (filing year).
p-values represent statistical significance using Wilcoxon rank sum test that the two sample groups are equivalent.

TABLE 6

AUDIT OPINION

Panel A: Qualified audit opinion

	# of qualified firms		
Year	–3	–2	–1
Distressed	252 (29%)	349 (40%)	695 (80%)
Performance matched	233 (24%)	303 (35%)	367 (42%)
p-value	(0.439)	(0.000)	(0.000)

Panel B: Qualified audit opinion at –2

	DCA					DLA			
Year	–3	–2	–1	0	Year	–3	–2	–1	0
Distressed	0.002	–0.0265	–0.0200	0.0888	Distressed	0.021	0.0152	–0.0432	–0.0482
Performance matched	0.004	0.0084	–0.0097	0.0032	Perf. matched	–0.011	–0.0279	–0.0357	–0.0036
p-value	(0.325)	(0.000)	(0.085)	(0.000)	p-value	(0.105)	(0.006)	(0.142)	(0.000)

Panel C: Qualified audit opinion at –1

	DCA					DLA			
Year	–3	–2	–1	0	Year	–3	–2	–1	0
Distressed	–0.011	–0.0175	–0.0275	0.0721	Distressed	0.012	0.0037	–0.0603	–0.0752
Performance matched	0.001	0.0083	–0.0115	0.0063	Perf. matched	–0.019	–0.0279	–0.0400	–0.0082
p-value	(0.128)	(0.002)	(0.071)	(0.001)	p-value	(0.097)	(0.001)	(0.006)	(0.172)

This table presents the frequency of modified (not 'clean') audit opinions up to three years prior to bankruptcy filing. For each category the table presents the median discretionary current accruals (DCA) and the discretionary long-term accruals (DLA) for years –3 to 0 (filing year). p-values represent statistical significance using Wilcoxon rank sum test that the two sample groups are equivalent.

Table 6 provide evidence that distressed firms exhibit lower discretionary current accruals than control healthy firms in year –1, and lower discretionary long-term accruals in years –1 and 0 (during which period we observe earnings-decreasing behaviour in Table 4). These results are consistent with the increased conservatism hypothesis induced by audit opinions.

These findings are consistent with our expectations that both top management turnover and audit opinions play a significant role on influencing managers' earnings reporting choices during the distressed period. The litigation threat auditors face during distress may increase auditors' monitoring role on distressed firms. Auditors of distressed firms are likely to be more conservative in their financial reporting choices and may insist on distressed firms taking non-cash write-offs, dividend reductions and reserves increases that may lead to decreases in accrual levels.[12]

Institutional Ownership

Previously we provided evidence that managers of highly distressed firms may decrease discretionary accruals up to a year prior to the filing year. In this section we test whether the institutional ownership mechanism of these firms helps mitigate these earnings management choices. Prior studies provide evidence suggesting that institutional investors are playing an active role in monitoring and disciplining managerial discretion, as well as improving information efficiency in the capital markets (Bushee, 1998; El-Gazzar, 1998). Consistent with those studies that identify investor protection as a key institutional factor affecting corporate policy choices (Shleifer and Vishny, 1997; La Porta *et al.*, 2000; Leuz *et al.*, 2003), we focus on institutional ownership as a significant mechanism determining earnings management activity. Table 7 reports comparative statistics for asset-scaled accruals among firms with different percentages of institutional ownership for the three-year period prior to bankruptcy filing. Firms are categorized based on the ownership percentage held by institutions in year –2, one year prior to the observed significant abnormal earnings behaviour. Firms are divided into five quintiles based on their institutional ownership. The lowest (highest) quintile consists of firms with the lowest (highest) 20 per cent institutional ownership. The second, third and fourth quintiles consist of firms with institutional ownership within the (21st–40th), (41st–60th) and (61st–80th) percentile range, respectively. Discretionary accruals are the performance-matched discretionary accruals calculated as the difference between accruals of the bankruptcy-filing firm and those of the ROA-matched firm.

Panels A1–A5 of Table 7 provide comparative results on the discretionary current accruals among the five quintiles of institutional ownership firms. Our results indicate that high institutional ownership firms (highest 5th quintile) exhibit less (negative) discretionary current accruals (with median value of −0.011) than low institutional ownership (lowest 1st quintile) firms (having median of −0.055) one year prior to bankruptcy filing. The decline from the lowest to the highest quintile

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[12] Moreover, untabulated results show that a variable based on the Big 4 audit firms did not have a significant impact on subsequent earnings behaviour.

TABLE 7

TIME SERIES COMPARISON OF ASSET-SCALED ACCRUALS BETWEEN FIRMS WITH DIFFERENT PERCENTAGE OF INSTITUTIONAL OWNERSHIP

Year	−3	−2	−1	0	−3	−2	−1	0	−3	−2	−1	0	−3	−2	−1	0	−3	−2	−1	0
Panel A: Performance-matched discretionary current accruals (DCA) based on their percentage of institutional ownership (IO)																				
A1. 1st quintile (<20%) of IO (lowest)					A2. 2nd quintile (21–40%) of IO				A3. 3rd quintile (41–60%) of IO				A4. 4th quintile (61–80%) of IO				A5. 5th quintile (>81%) of IO (highest)			
Mean	0.081	0.037	−0.061	−0.025	−0.021	−0.077	−0.060	−0.030	−0.098	0.028	0.114	0.179	−0.068	−0.074	−0.058	0.003	0.112	−0.023	0.008	0.124
p-value	(0.313)	(0.404)	(0.014)	(0.820)	(0.841)	(0.232)	(0.066)	(0.758)	(0.029)	(0.538)	(0.496)	(0.002)	(0.072)	(0.011)	(0.029)	(0.932)	(0.243)	(0.303)	(0.834)	(0.379)
Median	0.009	−0.024	−0.055	0.033	−0.025	−0.023	−0.036	0.038	−0.032	0.007	−0.021	0.094	0.019	−0.015	−0.033	0.037	0.006	−0.019	−0.011	0.075
p-value (Wilc.)	(0.506)	(0.845)	(0.003)	(0.363)	(0.022)	(0.502)	(0.040)	(0.849)	(0.021)	(0.729)	(0.171)	(0.000)	(0.524)	(0.034)	(0.037)	(0.503)	(0.538)	(0.120)	(0.873)	(0.397)
Std dev.	0.047	0.099	0.074	0.037	0.935	0.627	0.270	0.489	0.041	0.044	0.044	0.027	0.034	0.028	0.023	0.018	0.084	0.021	0.031	0.051
N	78	88	53	14	83	95	72	26	88	93	75	27	84	93	79	23	78	87	71	14
Panel B: Performance-matched discretionary long-term accruals (DLA) based on their percentage of institutional ownership (IO)																				
B1. 1st quintile (<20%) of IO (lowest)					B2. 2nd quintile (21–40%) of IO				B3. 3rd quintile (41–60%) of IO				B4. 4th quintile (61–80%) of IO				B5. 5th quintile (>81%) of IO (highest)			
Mean	0.112	0.332	0.028	0.227	0.069	0.238	−0.036	0.010	0.098	−0.005	0.014	0.043	−0.013	0.084	0.083	−0.309	−0.113	0.123	−0.179	−0.254
p-value	(0.252)	(0.075)	(0.823)	(0.598)	(0.694)	(0.172)	(0.632)	(0.973)	(0.031)	(0.947)	(0.827)	(0.822)	(0.690)	(0.154)	(0.226)	(0.221)	(0.300)	(0.096)	(0.142)	(0.369)
Median	−0.047	0.054	−0.093	0.107	0.019	−0.007	−0.087	−0.087	0.013	−0.035	−0.006	−0.164	−0.022	0.008	−0.011	−0.206	0.040	−0.024	−0.013	−0.186
p-value (Wilc.)	(0.410)	(0.010)	(0.013)	(0.470)	(0.043)	(0.925)	(0.045)	(0.183)	(0.178)	(0.120)	(0.700)	(0.325)	(0.142)	(0.210)	(0.822)	(0.045)	(0.245)	(0.862)	(0.740)	(0.064)
Std dev.	0.085	0.073	0.081	0.057	0.086	0.067	0.063	0.049	0.042	0.066	0.053	0.098	0.030	0.056	0.061	0.018	0.094	0.068	0.014	0.024
N	76	88	51	14	82	93	71	25	86	93	74	27	84	93	79	23	75	87	71	14

Firms are divided into five quintiles based on their percentage of institutional ownership. Firms are categorized based on the ownership percentage held by institutions in year −2, one year prior to the observed significant abnormal earnings behaviour. The discretionary accruals are performance-matched, calculated as the difference between accruals of the bankruptcy-filing firm and the performance-matched firm. The accruals measures are scaled by beginning-of-period total assets.

p-values represent statistical significance using *t*-test for the mean and Wilcoxon-test for the median that the variable is different from zero.

FIGURE 2

MEDIAN PERFORMANCE-MATCHED DISCRETIONARY CURRENT ACCRUALS (DCA)

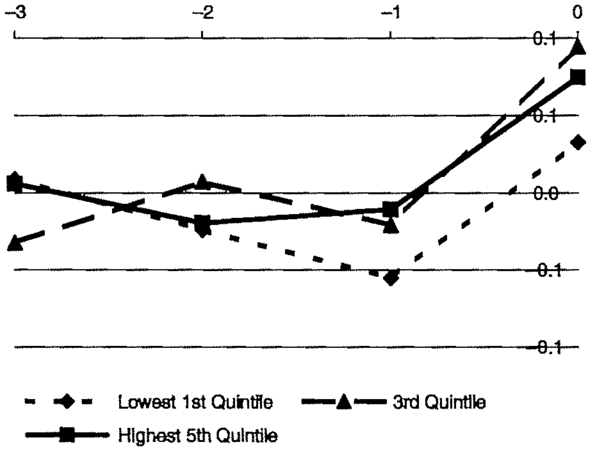
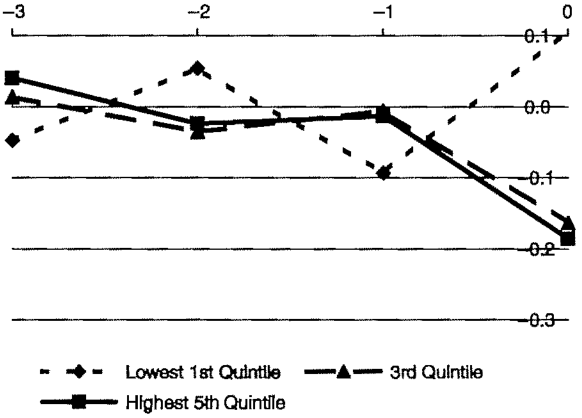


FIGURE 3

MEDIAN PERFORMANCE-MATCHED DISCRETIONARY LONG-TERM ACCRUALS (DLA)



of institutional ownership is smooth and consistent with our hypothesis that institutional ownership helps mitigate (downward) earnings manipulation (Figure 2). Panels B1–B5 of Table 7 present evidence on the discretionary long-term accruals among the five groups of institutional ownership. Similarly, high institutional ownership firms exhibit less (negative) discretionary long-term accruals than low institutional ownership firms.

TABLE 8

REGRESSION OF INSTITUTIONAL OWNERSHIP ON DISCRETIONARY CURRENT ACCRUALS

Model	Constant	INSOWN	QAUD	MNGCH	Adj. R^2	N
1	−0.122	0.045			0.03	145
	(0.040)	(0.015)			(0.039)	
2	−0.401	0.032	−0.206	−0.011	0.09	137
	(0.480)	(0.045)	(0.003)	(0.155)	(0.017)	

The dependent variable is the discretionary current accruals (DCA) one year prior to bankruptcy filing. The independent variable is the INSOWN, the percentage of institutional ownership at $t = -2$. In the multivariate regression we include two additional dummy variables, namely, QAUD which equals 1 if the firm received a qualified audit opinion in year −2 prior to bankruptcy, and zero otherwise, and MNGCH, which equals 1 if the firm had a management change in year −2 prior to bankruptcy, and zero otherwise. N is the number of observations.

To further examine the effect of institutional ownership on the earnings management of distressed firms, univariate and multivariate regression analysis was employed. Table 8 presents regression coefficients of institutional ownership against discretionary current accruals. The dependent variable is the performance-matched discretionary current accruals measure one year prior to bankruptcy filing. Consistent with our previous findings, the results of model 1 support that institutional ownership at year −2 is positively related with discretionary current accruals in year −1 prior to bankruptcy filing. Model 2 includes two additional dummy variables, namely, QAUD, which equals 1 if the firm received a qualified audit opinion in year −2 prior to bankruptcy filing, and zero otherwise, and MNGCH, which equals 1 if the firm had a management change in year −2 prior to bankruptcy, and zero otherwise. Results suggest that the institutional ownership in year −2 remains positive and significant in explaining the subsequent year's discretionary current accruals. Moreover, model 2 verifies previous evidence that qualified audit opinion is negatively related to the subsequent year's discretionary accruals, whereas the management change variable is also negative but insignificant.[13]

The above results are consistent with an expectation that higher institutional ownership may play a better monitoring role leading to lower earnings management. Given the negative earnings behaviour, the positive sign of the institutional ownership coefficient suggests that lower institutional ownership is associated with lower monitoring and higher downward earnings management. Similarly, the negative coefficients on qualified audit opinion and management change dummy variables show that these factors are responsible for possible earnings-decreasing behaviour of distressed firms one year prior to bankruptcy.

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[13] Untabulated multivariate regression analysis with the DLA component as dependent variable shows that DLA is not related to institutional ownership.

Institutional Ownership and Firm Performance

The previous section provided evidence that the institutional ownership mechanism reduces earnings management the year prior to bankruptcy filing. In this section, we examine whether institutional ownership (through its effectiveness on accruals) mitigates negative abnormal returns in the subsequent years. Even though a number of prior studies focused on the investigation of earnings management and/or institutional ownership during the distressed period, no prior research has examined the effective role of institutional ownership on firm performance.

Specifically, we compute the cumulative abnormal returns for the two twelve-month periods (–2, –1) and (–1, 0). The abnormal return is calculated as the difference between the actual and the expected return of the matched healthy firms. This analysis aids us in understanding whether institutional ownership mitigates subsequent abnormal returns. In this case, the abnormal returns of firms with low versus high institutional ownership (which was found to affect discretionary accruals) are expected to be statistically different.

Similarly to Foerster and Karolyi (2000), among others, we estimate the holding period returns net of a benchmark return. The yearly return for each firm is defined as the geometric capital gain returns beginning for each end of periods (–2, –1) and (–1, 0), either from the fiscal year end or four months later, whichever comes later in fixed length intervals regardless of calendar month-end dates. Specifically, the yearly return is defined as follow:

$$R_{i,T} = \prod_{m=1}^{12} (1 + R_{i,m}) - 1,$$

where $R_{i,T}$ is the yearly return over the fixed twelve months interval for firm i, T is the year of period-end interval, and $R_{i,m}$ is the monthly return for firm i of month m. Next, we use the yearly stock return to calculate the abnormal returns:

$$AR_{i,m} = R_{i,m} - R^{i}_{m},$$

where R^{i}_{m} is the return corresponding to the return of the matched firm during the corresponding year of the bankrupt firm (matching procedure with ROA).

Results in Panel A of Table 9 present comparable abnormal returns between low and high institutional ownership firms within the sample of firms with management turnover two years prior to bankruptcy filing. Firms with institutional ownership above the 60th percentile (of all management change sample firms) are considered 'High institutional ownership' firms, while those below the 40th percentile are considered 'Low institutional ownership' firms. Higher institutional ownership firms have *less negative* abnormal returns than lower institutional ownership firms during the last period (medians are –0.661 vs –0.875, respectively). Although the difference is statistically insignificant, these results provide some evidence that institutional ownership may reduce equity losses. Moreover, this evidence is more obvious when comparing the behaviour of the abnormal returns over time, for example, from period (–2, –1) to (–1, 0). Results show that firms with high institutional ownership have a 9 per cent decline in abnormal returns while firms with

TABLE 9

ABNORMAL RETURNS AND INSTITUTIONAL OWNERSHIP

Panel A: Management change firms

	Low institutional ownership		High institutional ownership	
	Abnormal returns		Abnormal returns	
	Period (–2, –1)	Period (–1, 0)	Period (–2, –1)	Period (–1, 0)
Mean	−0.482	−0.923	−0.534 (0.72)	−0.889 (0.88)
Median	−0.377	−0.875	−0.571 (0.64)	−0.661 (0.79)
N	60	35	62	39

Panel B: Qualified audit opinion firms

	Low institutional ownership		High institutional ownership	
	Abnormal returns		Abnormal returns	
	Period (–2, –1)	Period (–1, 0)	Period (–2, –1)	Period (–1, 0)
Mean	−0.556	−0.906	−0.491 (0.52)	−0.785 (0.84)
Median	−0.462	−0.701	−0.512 (0.41)	−0.805 (0.73)
N	170	89	166	80

Panel C: Abnormal returns vs institutional ownership, qualified audit opinion and management change

Model	Constant	INSOWN	QAUD	MNGCH	Size	B/M	Δsales	Audit	Adj. R^2	*N*
1	−0.325	4.844	−0.145	−0.027					0.021	140
	(0.000)	(0.050)	(0.069)	(0.089)					(0.091)	
1′	−0.375	5.120	−0.086	0.007	0.050	0.001	0.000	0.052	0.083	135
	(0.003)	(0.042)	(0.055)	(0.884)	(0.004)	(0.338)	(0.008)	(0.681)	(0.001)	
2	−0.446	3.463	−0.054	−0.023					0.015	88
	(0.000)	(0.085)	(0.418)	(0.786)					(0.125)	
2′	−0.398	3.801	−0.055	−0.028	0.016	0.001	0.000	−0.070	0.024	86
	(0.000)	(0.076)	(0.426)	(0.750)	(0.234)	(0.297)	(0.819)	(0.466)	(0.152)	

Parentheses in Panels A and B represent statistical significance using *t*-test for the mean and Wilcoxon *p*-values for the median differences between Low and High institutional ownership.

Panel A presents comparative mean and median abnormal returns between Low and High institutional ownership firms with top management change two years prior to bankruptcy-filing. Firms with institutional ownership above the 60th percentile (of all management change sample firms) are considered High institutional ownership firms, while those below the 40th percentile are considered Low institutional ownership firms. Results are presented for the periods (–2, –1) and (–1, 0). Panel B presents comparative mean and median abnormal returns between Low and High institutional ownership for firms that had qualified audit opinions two years prior to bankruptcy filing. Panel C presents regression results on the association of abnormal returns with institutional ownership, qualified opinion, and management change. In models (1) and (1′), the dependent variable is abnormal returns in period (–2, –1) and abnormal returns of period (–1, 0) in models (2) and (2′). Abnormal returns are regressed against the percentage of institutional ownership and two dummy variables, namely, QAUD, which equals 1 if the firm received a qualified audit opinion in year –2 prior to bankruptcy, and zero otherwise, and MNGCH, which equals 1 if the firm had a management change in year –2 prior to bankruptcy, and zero otherwise. In models (1′) and (2′) we additionally include four control variables: Size = Ln (Market equity), B/M = book-to-market ratio, ΔSales = change in sales, and a dummy 'Audit', which takes the value of 1 if the firm is audited by one of the Big 5 auditing firms, and 0 otherwise. N is the number of observations.

low institutional ownership have a much higher decline (49 per cent) during the last year (–1, 0) prior to bankruptcy filing.[14] These results corroborate our argument that institutional ownership mitigates negative abnormal returns. That is, when new managers deliberately report lower earnings to make outgoing managers look bad so they will themselves look better in subsequent years, they bias earnings downwards and likely depress the stock price in the short term, which may result in biased subsequent returns.

Results in Panel B of Table 9 present comparable abnormal returns between low and high institutional ownership firms within the sample of firms with qualified audit opinions two years prior to bankruptcy filing. In contrast to the previous panel, results show that the abnormal returns of low versus high institutional ownership firms are similar for both groups of qualified firms. This result is consistent with the argument that, as audit opinions induce managers to act prudently in being conservative, they result in insignificant impact on subsequent returns. This may be a typical consequence of the higher attention these firms draw from the market.

Furthermore, Panel C presents regression results on the association of abnormal returns with institutional ownership, qualified opinion and management change. The dependent variable is abnormal returns of period (–2, –1) in models (1) and (1′) and abnormal returns of period (–1, 0) in models (2) and (2′). Abnormal returns are regressed against the percentage of institutional ownership and two dummy variables, namely, QUAD, which equals 1 if the firm received a qualified audit opinion in year –2 prior to bankruptcy, and zero otherwise, and MNGCH, which equals 1 if the firm had a management change in year –2 prior to bankruptcy, and zero otherwise. Models (1′) and (2′) also include four control variables: Size, B/M, ΔSales, and 'Audit'. 'Audit' is a dummy variable which takes the value of one if the firm was audited by a Big 5 audit firm, and 0 otherwise.[15] Results verify that institutional ownership in all models tested is positively related to subsequent abnormal returns. That is, high percentage of institutional ownership mitigates negative abnormal accruals that lead to less negative abnormal returns. Results in models (1) and (1′) show that qualified audit opinion is negatively related to subsequent abnormal returns. Similar results are provided for management change in model (1). These findings are consistent with our prior evidence that qualified audit opinion and management change lead to negative abnormal returns.[16]

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[14] The 9 per cent and the 49 per cent were estimated as follows: 9 per cent is the difference in the median figures in the high institutional ownership group between periods (–2, –1) and (–1, 0); 49 per cent is the difference in the median figures in the low institutional ownership group between periods (–2, –1) and (–1, 0).

[15] 'Audit' was included in the model as a control variable since previous studies suggest that a firm audited by a Big 5 accounting firm does not exhibit significant earnings management (Rosner, 2003; Koh, 2003).

[16] The control variables, with the exception of size and Δsales in model (1′), seem to have no significant effect on subsequent abnormal returns.

CONCLUSIONS

Earnings reporting choices of managers of distressed firms during the distressed period were examined by looking at sources of abnormal accruals prior to the bankruptcy-filing year. Over the nineteen-year period 1986–2004, 859 U.S. bankruptcy-filing firms were examined. Managers of distressed firms generally engaged in earnings-decreasing behaviour prior to bankruptcy filing. We consequently examined possible incentives motivating managers to decrease earnings during the distressed period. Specifically, we examined how management turnover and audit opinions may induce subsequent earnings decreasing behaviour during the distressed period. We also tested whether institutional ownership might help mitigate downward earnings management and negative abnormal returns. Significant earnings-decreasing choices up to one year prior to the bankruptcy-filing year were found to be associated with both current and long-term accruals. Our results suggest that earnings decreases may be partly due to new managers' earnings bath choices, and that qualified audit opinions may additionally induce managers to be more conservative in their financial reporting choices. We also found that the management of distressed firms with lower (higher) institutional ownership has greater (lesser) tendency to manage earnings downwards. Finally, we provide evidence that institutional ownership mitigates negative abnormal returns for firms experiencing a top-level management change, while results are similar for all levels of institutional ownership possibly due to the greater attention given by the market to firms with qualified audit opinion prior to the bankruptcy-filing year. Prior studies focused on the investigation of earnings management or institutional ownership (separately) during the distressed period, but did not examine if the effect of institutional ownership on management choices also influences subsequent returns.

In summary, the results reported here should be of interest to stakeholders, analysts, standard setters and regulatory bodies since our results show that management turnover, qualified audit opinions and firm governance mechanisms affect the quality of earnings and the level of abnormal returns. Our results are expected to provide impetus for further research. For example, other corporate governance mechanisms that might affect managerial discretion can be examined in more depth, possibly in conjunction with the level of institutional ownership, for a better understanding of managers' accounting choices.

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Discussion of Charitou, Lambertides and Trigeorgis

Charitou *et al.* (2007; hereafter CLT), examine the behaviour of accruals for a sample of 859 U.S. firms that filed for bankruptcy over the period 1986–2004. They show that earnings and cash flow from operations drift downwards in the four years prior to bankruptcy, although cash flows from operations drift upwards in period 0 (year of bankruptcy). Total accruals are negative and decreasing over the four-year bankruptcy period. Performance matched current abnormal accruals fluctuate over the period, but are mostly negative (i.e., income decreasing). The performance matched long-term discretionary abnormal accruals decline each year.

CLT examine if management turnover, qualified audit opinions and institutional ownership impact the 'discretionary' accruals over the four years prior to bankruptcy. They conclude that earnings decreases may be partly due to new managers' taking earnings baths and that qualified audit opinion may induce managers to employ more conservative financial reporting choices. They also conclude that distressed firms with lower levels of institutional ownership have a greater tendency to manage earnings. Finally CLT undertake market-based tests and conclude that institutional shareholders mitigate the negative abnormal returns.

At the Forum, the discussion concentrated on some of the fundamental problems associated with research in the areas of financial distress and accruals management. The particular issues of concern were: what constitutes financial distress?; the reliability of accrual models; and the choice of explanatory variables. After outlining these issues I will then comment on the interpretation of the results.

WHAT CONSTITUTES FINANCIAL DISTRESS?

One of the fundamental problems of financial distress research is the lack of underlying theory. This leaves the researcher with the problem of how to define 'financial distress' and what variables to put in the model to explain financial distress.

CLT describe the prior literature as providing 'mixed results with regard to earnings behaviour of distressed firms'. This is not surprising, given the multitude of definitions used for 'financial distress' in prior literature. Table 1 shows that prior research has used various states of financial distress, such as 'bankruptcy', dividend reductions, continuing losses, debt covenant violations (both servicing and technical violations), going concern audit opinions and the change of management. However, it is not clear if there is a hierarchal or time sequence or random relation between these events.

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TABLE 1

PRIOR RESEARCH

	Sample	'Financial distress' event examined
Charitou *et al.* (2007)	859 firms 1986–2004 Matched sample	Bankruptcy Control for: • management change • audit qualification • institutional ownership
DeAngelo *et al.* (1994)	76 NYSE firms 1980–85	Dividend reduction Continuing losses
DeFond and Jiambalvo (1994)	94 firms 1985–88 Matched sample	Debt covenant violation Control for • management change • going concern qualification
Roser (2003)	293 firms 1985–97	Bankruptcy; assigned to four states: (1) negative working capital (2) operating loss in any of three prior years (3) retained earnings deficit in year 3 (4) bottom-line loss in any of three prior years
Sweeney (1994)	130 firms 1980–89 Matched sample	Debt covenant violation

CLT use bankruptcy because it is a 'severe' or 'highly distressed' measure of financial distress. While this is a reasonable approach, the years before bankruptcy are likely to be confounded with other events of 'financial distress' such as debt default, management buyouts, takeovers, adverse audit opinions. In studying financial distress the researcher must try to control for events, other than the primary event of interest (e.g., bankruptcy), that might also give rise to financial distress. Another approach would be to further classify the bankrupt firms into various states of distress (e.g., McKeown *et al.*, 1991; Roser, 2003).

Another issue with 'bankruptcy' is that it is a legal condition as well as a financial one. Hence, an entity that is bankrupt in the U.S. might not be bankrupt in another legal jurisdiction. Furthermore, other jurisdictions have different legal definitions of financial distress (e.g., 'receivership'). Hence the external validity of CLT is likely to be limited.

THE RELIABILITY OF ACCRUAL MODELS

Following Teoh *et al.* (1998), CLT decompose accruals into four categories—current, non-current, discretionary and non-discretionary—and use a cross-sectional adaptation of the modified Jones (1991) model. They also provide results using performance matched accruals (Kothari *et al.*, 2005).

A key methodological issue in the paper is how well these models are able to partition accruals into normal and abnormal components. There is increasing evidence that these models provide very noisy estimates of 'abnormal' accruals.[1] The simulation results in Dechow *et al.* (1995) show that amounts of earnings management under 5 per cent of total assets are likely to go undetected. Thomas and Zhang (2000) show that most models will not outdo a naive model where: total accruals = –5% (last period's total assets). More recently, Jones *et al.* (2006) find that popular discretionary accrual models fail to capture a substantial amount of extreme earnings management. They find that only models by Kothari *et al.* (2005), Dechow and Dichev (2002) and McNichols (2002) are able to detect fraudulent earnings beyond a simple measure of total accruals.

Existing accrual models make very noisy estimates of accruals, especially for firms with extreme performance. That is, abnormal accruals are more negative (positive) for firms with extreme poor (good) performance. CLT's sample comprises firms that are likely to contain a larger proportion of firms with unusually negative accruals due to reasons other than managers' accrual discretion. These include asymmetrical accounting practice (e.g., such as the lower of cost of market basis for inventory measurement) and managers' real decisions (e.g., lowering inventory levels to conserve cash). It is difficult to test hypotheses that predict an increase in negative (income decreasing) accruals, when the experimental bias in the accrual model is in the same direction.

The forum noted that accruals are not the only accounting measure that can be used to investigate potential earnings management. Another approach would be to examine the portfolio of accounting policy choices, voluntary changes in accounting policies, and the early adoption of mandatory changes (see Sweeney, 1994). CLT ignore the impact of any accounting policy changes over the period 1986–2004 on their accrual measures, including the effect of mandatory accounting changes.

THE CHOICE OF EXPLANATORY VARIABLES

In research of this type the researcher must select the variables of interest they think will be related to abnormal accruals. CLT examine the association between audit qualification, management change and institutional ownership.

An alternative approach would be to examine a single explanation in more detail. For example, in addition to further analysing the audit opinion explanation beyond a simply modified/unmodified indicator variable, we might concentrate on the role of auditing and accruals in the years before bankruptcy. Such an analysis would include variables related to audit quality (e.g., Big 4 auditors, industry specialists and 'superior quality' audit committees) and the provision of additional analysis on the type of audit qualification. Butler *et al.* (2004) examine the types of modified opinions that are associated with large accruals. They find that it is the firms with a going concern opinion that drive opinion/accrual relation. They also conclude that there is no evidence that firms receiving modified audit opinions manage earnings more than those receiving clean audit opinions. In contrast, CLT conclude that their results 'are consistent with the increased conservatism hypothesis induced by audit opinion'. We can only speculate how robust the results would be if an in-depth analysis of the role of the audit function were undertaken.

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[1] See McNichols (2000) for a discussion of research design issues relating to earnings and accruals models.

While the choice of institutional shareholding as an explanatory variable is novel, it does not have a strong conceptual basis. In my opinion, there is large gap between the level of institutional ownership and the manipulation of accruals. Furthermore, the arguments provided by CLT apply to all investors (e.g., 'earnings behaviour may adversely affect share prices') not just institutional investors. The link would be strengthened if the institutional investors were represented by a director, especially on the audit committee. CLT motivate the use of institutional ownership by invoking the relation between institutional investors and 'investor protection'. However, it is difficult to follow the implications of this relation for this study. Prior research has examined investor protection across jurisdictions. CLT is a study within one jurisdiction, so it is not clear that there is any variation in 'investor protection'.

INTERPRETATION OF RESULTS

There are several features that cause me to doubt the interpretation of the results in CLT. My concerns relate to the terminology used, the discussion, and the sample.

Terminology

One of the unfortunate features of the 'earnings management' literature, in my opinion, is that the papers move too quickly from the label 'abnormal accruals' to infer 'discretionary accruals' and then to infer 'earnings management'. CLT is no exception. My preference is to use the 'abnormal' label while describing the results of the study and leave the terms 'discretionary' and 'earnings management' until the discussion of the results. The discussion should also include other possible interpretations, such as poor modelling of 'normal' accruals; the impact of events, conditions and firm performance on 'abnormal accruals'; and the (in)ability to distinguish between discretionary and nondiscretionary abnormal accruals.

Discussion

The results in the paper are not strong. For example, in Table 4 the 'performance matched discretionary accruals' for both current and non-current accruals are only significant in year –1. In Table 9 none of the univariate results are significant and only one of the multivariate regressions has a significant *F* test at the 0.01 level. The reader needs to be careful because statements are made about results that are not significant. Furthermore, in many instances the discussion of the results is selective. For example, in discussing Table 2, CLT claim that the 'median net income (and cash flow) measure is lowest one year prior to bankruptcy filing'.

This is true only for cash flows but not net income. Given the large positive cash flow in year 0 (Table 2), I find it difficult to agree that 'cash flows appear more stable'.

In Table 5, Panels B1 and B2, the results are similar. They are significant only for periods –1 and 0 and not for periods –3 and –2. This suggests that the results, while possibly dependent on management change, are independent of *when* management changes (otherwise the results in Panel B would be a period earlier). Similar comments could be made about Table 6. I do not agree that the results 'suggest that management changes may affect subsequent earnings choices' or 'are consistent with the increased conservatism hypothesis induced by audit opinions'. There is an association but there is nothing to suggest a causal relation.

Sample

The number of observations differs in each panel of each table. My concern is the variation in accruals from year to year before bankruptcy might arise from different samples, as much as from the hypothesized cause. Another concern I have is that the institutional ownership variable is measured at period –2, rather than being allowed to vary in each period.

If a sample self-selects (e.g., bankrupt firms), the possibility of omitted correlated variables is a major concern when designing the study and interpreting the results. One of the main research design features to mitigate this issue is the use of a 'healthy' or performance matched sample. CLT match each bankrupt observation with a firm in the same industry, same calendar year, with a similar return on assets in year –3. However, Table 2 of the paper reveals that in period –3 the performance adjusted cash flows and net income are non-zero in period –3. That is, despite the best efforts of the authors, the matching process is not effective.

Furthermore, it is not clear in all cases why the matched pair test is the most interesting comparison in a time-series study. For example, the main conclusion from Tables 5 and 6 is that management turnover and modified audit opinion are (significantly) greater for distressed firms than for 'healthy' firms. We also know from Table 4 that bankrupt firms have increasingly negative earnings. Therefore another approach would be to analyse the marginal impact on negative accruals of management turnover and modified opinions for the sample of bankrupt firms only.

On the other hand, the institutional investor analysis seems to assess the marginal contribution. For example, 'institutional investors of distressed firms have incentives to mitigate earnings-decreasing (accruals) behaviour whether due to management turnover or conservatism imposed by auditors'. Also Table 9 assesses the marginal contribution of INSOWN. While Table 8 assesses the marginal contribution of QAUD and MNGCH on INSOWN, the story is built around the marginal contribution of INSOWN on QUAD and MNGCH.

CONCLUDING REMARKS

Trying to uncover an empirical regularity between accruals and financial distress is an interesting endeavor. In this type of research there are a number of methodological choices, including the choice of the primary financial distress event and the need to control for other potential events that might impact accruals. Given our state of knowledge of the effect of auditing or management change on bankruptcy, it is not clear that we can use simple dummy variables to control for these events, while looking for more exotic effects, such as institutional ownership.

A fundamental research issue is the partitioning of accruals into discretionary and nondiscretionary components. This is fraught with difficulties. Untangling the effects of earnings manipulation, real decisions, and abnormal non-discretionary accrual on total accruals is a major barrier to interpreting the results. Interpretation is even more difficult when extreme negative performance creates extreme negative abnormal accruals and the events of interest also hypothesize negative abnormal accruals.

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MAURICE PEAT

Factors Affecting the Probability of Bankruptcy: A Managerial Decision Based Approach

The majority of classification models developed have used a pool of financial ratios combined with statistical variable selection techniques to maximize the accuracy of the classifier constructed. Rather than follow this approach, this article seeks to provide an explicit economic basis for the selection of variables for inclusion in bankruptcy models. This search to develop an economic theory of bankruptcy augments the existing bankruptcy prediction literature. Variables which occur in bankruptcy probability expressions derived from the solution of a stochastic optimizing model of firm behaviour are 'proxied' by variables constructed from financial statement data. The random nature of the lifetime of a single firm provides the rationale for the use of duration or hazard-based statistical methods in the validation of the derived bankruptcy probability expressions. Results of the validation exercise confirm that the majority of variables included in the empirical hazard formulation behave in a way that is consistent with the model of the firm. The results highlight the need for developments in the measurement of earnings dispersion.

Key words: Bankruptcy; Distress prediction; Failure; Model; Theory.

Managers are constantly making decisions which affect the performance and survival of their businesses. Some of these decisions are publicly announced, many are not. Some have described this as a process of continuous adaptation (Chambers, 1986; Ataullah *et al.*, 2006); for multiple references see Chambers (1995). The financial outcomes of these decisions are ultimately revealed in the periodic financial statements issued by the firm. For example, if a company borrows to finance an investment, the amount of debt on the balance sheet will increase and the associated increase in interest paid will be reflected in the income statement. Analysts interested in the decisions of management and their impact on the financial position of the firm can use changes in financial statements to deduce the decisions taken within the firm. Complex decisions can often only be inferred from the analysis of a series of financial statement based metrics. For instance, making inferences about a decision to increase operational efficiency would be require a time series of margins of the DuPont variety.

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This approach to financial analysis, which uses measures constructed from financial statements to deduce management decisions, can be described as an implicit approach. The common cross-sectional and time series approaches to financial ratio analysis are examples of implicit analysis, where management decisions can be inferred from their reported effects. Implicit analysis has been widely employed in the area of distress analysis. The early work of Beaver (1966) was based on analysing patterns in the financial ratios of failed and continuing firms in the years leading up to financial distress. Similarly, Altman's (1968) MDA approach used a linear combination of financial ratios to generate criteria for classifying firms as failing or continuing. The usefulness of this approach to distress analysis, demonstrated by these studies, was quickly grasped by practitioners and researchers, who generated a large body of research on financial distress prediction.[1]

This research progressed through the utilization of increasingly sophisticated statistical models and the exploration of a wide range of possible explanatory factors. A large number of explanatory variables were used in these studies. Pinches *et al.* (1973), Stevens (1973) and Libby (1975) applied statistical dimension reduction methods to sets of variables derived from failure classification studies. Their aim was to extract a small set of factors which could span the information in the financial ratios. Pinches *et al.* applied Factor Analysis[2] to a set of forty-eight financial ratios constructed for 221 industrial firms. They found seven underlying factors captured the information in these ratios. They interpreted the factors as representing: return on investment, capital intensiveness, inventory intensiveness, receivables intensiveness, financial leverage, short term liquidity and cash position.

Zavgren (1985) builds on all of this implicit empirical work. A logit based model, with the ratios identified by Pinches *et al.* (1973) as representative of the underlying financial information, was used to estimate the probability of financial distress. This work can be taken as the pinnacle of the implicit empirical approach; it incorporates the maximum amount of financial information in a parsimonious, probabilistic model. While managers and analysts could consider the results of this, or other, implicit studies to infer the effect of the managerial decisions on the probability of default, no direct link between decisions taken and default probability is described. For example, if return on capital (ROC) is shown to be negatively associated with the probability of default, a valid inference is that decisions which lead to an increase in ROC, while not changing the six other factors, will lead to a decrease in the probability of default. However, the model offers no guidance to managers on how to effect the increase in ROC required.

There is also a body of research that uses mathematical or statistical models to derive distress probabilities. As noted, much of this research is implicit, assuming a mathematical or statistical process that terminates in a distressed state. The factors that influence the progress of the process towards the distressed state are then derived. Examples of this explanatory approach are gambler's ruin models (Wilcox, 1971, 1976), catastrophe theory (Scapens *et al.*, 1981; Francis *et al.*, 1983) and contingent claim models (Hillegeist *et al.*, 2004). In general these models treat the default event as an exogenous occurrence governed by an assumed probabilistic or dynamic mathematical process. The actions of managerial decision makers have no impact on the evolution of the process from its initial values. As with the implicit empirical models, managers get guidance for action by studying the effect of the initial conditions on the path to distress. In these models managers can only influence the evolution of the assumed process by taking decisions which modify the initial values. Once the process starts they play no further role in the determination of distress.

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[1] For a summary of this work see Jones and Hensher (2007) and Altman and Sabato (2007) in this issue.

[2] Factor analysis is a statistical technique to explain the correlations between observable variables in terms of underlying factors, which are themselves not directly observable.

Christenson (1983) argues that to make reasonable predictions a set of initial conditions and an empirical theory are required. In terms of making a prediction of the probability of distress, the initial conditions would be a set of financial statements and the empirical theory would need to relate the behaviour of the accounting entity (the firm) to the occurrence of distress. Such an empirical theory would be a 'primary level' theory according to Christenson's taxonomy of accounting problems (p. 5). When managers and analysts develop solutions to financial analysis problems in this way, proceeding from a model of the behaviour of the firm to the prediction of some aspect of the firm's financial performance, they are engaging in explicit analysis. This form of analysis is especially informative when the empirical model used addresses the decision context of the managers of the firm. It will then be possible for managers and analysts to understand the direct linkages between decisions taken by management and their financial outcomes. This approach to the analysis of distress is used in Schipper (1977) in the context of private colleges. It is also suggested in Foster (1986, Ch. 15). Schipper uses an optimizing model which captures the objectives, choices and constraints faced by college administrators. Solutions to the model are derived using optimal control theory and stability conditions for the solution found. Empirically testable hypotheses, based on the stability conditions, are derived by noting that distress will be associated with regions of instability in the solution space. These hypotheses are then tested using data from a sample of private colleges in a discriminant analysis framework. Due to the specialized nature of the problem addressed by Schipper, researchers did not generalize the model and apply the explicit approach to distress prediction in other types of entity.

The article seeks to address the following issues: First, to show how the results from an optimizing model of the firm can be used to evaluate the probability of bankruptcy, depending on the current setting of managers' decision variables; and second, to attempt an empirical validation of the relationship between the economic variables defined in the model and the analytical bankruptcy probability expressions. The economic variables defined in the model will be mapped to accounting measures that are reported by all firms under existing accounting standards. While this article does not seek to enter the debate on the theory of measurement in accounting, it will conclude with suggestions for research in this field.

THE DETERMINANTS OF BANKRUPTCY

This section develops a dynamic, stochastic, constrained value-maximizing model of a firm facing the possibility of bankruptcy. Bankruptcy criteria implied by the model are presented and analysed. The model, and its solution concept, is based on the work of Bensoussan and Lesourne (1981) who were concerned with the policies which would lead to optimal growth of a firm facing an uncertain economic environment. Managerial decision makers can select policies based on the settings of the decision variables under their control, and thus the probability of the firm becoming bankrupt under each policy is derived.

The modelling framework adopts a stochastic, dynamic optimizing approach. This differs from the stability analysis approach of Schipper (1977) and the catastrophe theory approach of Scapens *et al.* (1981). These models rely on the analysis of the stability of solutions of a dynamic system. The stochastic models of Wilcox (1976), a gambler's ruin approach, and the option approach concentrate on the liquidation value of the firm. This value is measured by the asset base in the gambler's ruin approach, or the value of the firm in the options approach. The bankruptcy conditions of these models are not based on the liquidity of the firm, which is fundamental to the model presented here.

In the model, a firm is created with a given initial equity with no new equity issues made during the life of the firm. These funds can be invested in productive resources or held as cash balances. The productive resources are used to earn random earnings in any period. If the profit derived from these earnings is positive, it can be used to pay dividends to the shareholders, invest in new productive resources, repay outstanding debt or increase the firm's cash balance. The firm is able to borrow and repay funds up to a credit limit. When the realizable assets of the firm fall to zero the firm is bankrupt.[3] The firm attempts to maximize the stream of dividends paid to shareholders during its life. Management policies and their associated bankruptcy probability conditions are derived from a dynamic programming solution to the model.

The variables which differentiate between the possible model solutions identified by the analysis are proxied by variables commonly found in financial statement data. These proxy variables will be used in the empirical validation of bankruptcy probability expressions derived from the model.

The random nature of the time horizon in the model for a single firm provides the rationale for the use of duration or hazard-based statistical methods in the validation of bankruptcy probability expressions.

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[3] This is an inability to meet current commitments. Such events cause the firm to default on a loan agreement, triggering the bankruptcy process. See Giroux and Wiggins (1984) for a description of this sequence of events.

MODEL OF A FIRM FACING A RISK OF BANKRUPTCY

When the firm is created it has a fixed amount of equity capital, K_0. For exposition no new equity raising is permitted. The initial equity capital is split between the purchase of productive resources, c_0, and holding a cash balance, m_0, such that $K_0 = c_0 + m_0$.

Choice of Objective

The objective of the firm is to maximize the expected value of discounted dividend distribution over the life of the firm (i.e., maximize shareholder wealth), namely

$$\phi = \max E\left[\int_0^{\tau} w_t e^{-it} dt\right], \qquad (1)$$

where w_t is the total dividend paid by the firm at time t, i is the required rate of return of the shareholders, and τ is the life time of the firm. This objective function outlines a dividend policy for the firm in continuous time. The management of the firm is continuously adjusting dividend payments to ensure that investments made for future production, debt policy and the cash management policy of the firm are aligned to maximize shareholder wealth over time. This approach to dividend policy is consistent with the Lintner's (1956) findings on the dividend adjustment policies of managers. A firm can be considered to be bankrupt when it does not have cash available to meet obligations, such as debt repayments, as they fall due.[4] Let m_t be the amount of cash (or very liquid assets) available to the firm at time t. A firm goes bankrupt at time τ, $0 \le \tau \le \infty$, the first date at which the firm's cash balance is strictly negative, $m_{t^*} \le 0$. The value of τ is not known in advance. It is a random variable conditioned on the decisions made by the management of the firm and the realized value of uncertain earnings. This objective is consistent with the firm's management acting to maximize shareholder wealth.

Earnings Uncertainty in the Model

The earnings of the firm[5] are uncertain, they evolve according the following process[6]:

$$d\pi_t = (\theta f[c_t])\,dt + \varepsilon dz_t.$$

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[4] The legal definition of insolvency in (say) Australia—'an inability to meet debt obligations as and when they fall due'—is a less stringent test.

[5] In practice $d\pi_t$ is approximated by the firm's earnings before interest depreciation and taxes (EBIDT).

[6] Goldstein *et al.* (2001) take a similar approach. They model the contingent claims against EBIT, where EBIT is modelled as a geometric Brownian motion, in a study of the dynamics of the firm's capital structure.

The term $\theta f[c_t]$ is the drift of the process. This term determines how, on average, the process will behave in the next small increment of time. In this case it represents the earnings that the firm will generate using the current stock of productive resources, c_t. The function $f(\bullet)$ is a concave production function with $f(0) = 0$. The function is scaled by a constant parameter θ. The value $\theta f[c_t]$ is equivalent to the expected component of the earnings of the firm.

The constant, ε, is the diffusion coefficient of the process. It defines the extent of earnings uncertainty for the firm. This constant captures both firm specific and economy-wide influences on the earnings of the firm. A firm with a high level of earnings uncertainty will be characterized by high values of ε. dz_t is the Wiener process which drives earnings. The product εdz_t is the extent of earnings surprise observed at time t. At time t, the value of both $\theta f[c_t]$ and ε will be observed, and adapted to the information set available, I_t.

Definition of Variables and Constraints

The financial decisions that the firm can make describe the control variables in the model. In any period t, the firm can invest in new productive resources, v_t, change the level of debt by u_t, or pay a dividend, w_t, to shareholders.

The current financial position of the firm is recorded in the balance sheet. This position defines the current state of the firm. The balance sheet relationship in any period is defined as

$$c_t + m_t = x_t + OE_t \tag{2}$$

By definition the firm's assets, productive resources, c_t, and cash and cash equivalents,[7] m_t, are equal to the firm's liabilities, the amount of outstanding debt, x_t, and shareholder's equity, OE_t. The shareholder's equity is the balancing item in this simple balance sheet.[8]

State Transition Equations

The values of the variables c_t, m_t and x_t define the current state of the firm. The first state transition equation describes changes in the cash position of the firm

$$dm_t = [\theta f(c_t) - rx_t - v_t - w_t + u_t]dt + \varepsilon dz_t, \tag{3}$$

where r is the rate of interest payable on the outstanding debt, and rx_t is total interest payable.

Equation (3) is a cash flow definition. The cash flow of a firm is derived from the operating activities of the firm. These activities are the cash transactions arising from the day-to-day running of the business. They are typically recorded in a firm's profit and loss statement. The difference between the uncertain profit and interest payable, $[\theta f[c_t] + \varepsilon dz_t] - rx_t$, describes operating cash flow.[9] Financing activities, which cover changes to the level of debt and the payment of dividends to equity holders, $u_t - w_t$ are the second component of cash flow. Investing activities, including the purchase and sale of assets by the firm, v_t, are the final cash flow component. Changes to the firm's cash position can be positive or negative.

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[7] Hereafter cash is synonymous to 'cash and cash equivalents'.

[8] As is common in financial statement analysis the owner's equity, OE_t, is the residual value in the balance sheet. It is $OE_t = c_t + m_t - x_t$.

The transition equation for debt is

$$\frac{dx}{dt} = u_t. \tag{4}$$

The firm can choose to change its debt level by u_t in any period. When the firm borrows more funds, u_t is positive. If the firm repays debt then u_t is negative.

The final state transition equation is for productive resources. It is given by

$$\frac{dc}{dt} = v_t, \tag{5}$$

The change in the stock of capital equipment is the level of investment at time t. This assumes that there is no physical deterioration of productive resources and all additions increase productive resources. That is, the firm's investment decisions, v_t, add to the amount of earnings generating productive resources.

The initial values of the state variables define the starting point for the development of the firm. Let c_0, a constant, be the initial value for productive resources, m_0 be the initial value for the cash balance and x_0 be the initial amount borrowed. These initial values have to be feasible. That is, they have to obey the constraints of the model.

Constraints

The decisions that the management of the firm may make in any period are constrained in a number of ways. From the definition of bankruptcy, cash or very liquid assets held at any time t must be non-negative. That is,

$$m_t \geq 0. \tag{6}$$

Firms facing a cash shortage will often sell assets as part of a reorganization process. They cannot sell more assets than the current holding of productive resources. That is,

$$v_t \geq -c_t. \tag{7}$$

Dividends are, by definition, a payment to shareholders and as such cannot be non-positive. The equity capital of the firm is assumed to be constant, the firm cannot raise new equity by asking for a shareholder payment, which would appear as a negative dividend. Both of these considerations imply that dividend payments are bounded from below such that

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[9] In the absence of corporate taxation and depreciation charges, this is equivalent to net income.

$$w_t \geq 0. \tag{8}$$

There is a limit on the amount of debt that the firm can carry. This limit is set by constraining the debt to assets ratio of the firm, such that

$$0 \leq \frac{x_t}{(c_t + m_t)} \leq h \quad \text{where} \quad 0 \leq h \leq 1. \tag{9}$$

This constraint, in conjunction with the interest rate on debt, r, provides a mechanism that financial institutions can use to manage their exposure to the risky earnings of the firm. For firms with highly variable earnings (i.e., ε is large), financial institutions will set a small value for h. This minimizes their exposure to default. They will also set a high interest rate to achieve a return that compensates for risk. This type of constraint is consistent with financial institutions assigning firms to a 'risk class'. For the firm to borrow more than the value of $h[c_t + m_t]$, the interest rate, r, would have to be renegotiated. This constraint is a simplification of the operational practices of financial institutions, as historic and projected cash flows will also be part of their decision making process.

This constraint also provides a limit on the amount that can be borrowed or repaid in any period. If the firm has not borrowed ($x_t = 0$), then the maximum it can borrow is $h[c_t + m_t]$. If the firm has borrowed up to its limit, the maximum repayment that the firm will make will be $h[c_t + m_t]$. So the change in the firm's level of debt is bounded by

$$|u_t| \leq h[c_t + m_t], \tag{10}$$

which is derived from the non-negativity constraint on debt and the upper limit on borrowing.[10]

The firm is not allowed to use borrowed funds to finance a dividend distribution. Dividends can only be paid from expected earnings after interest expenses have been paid, which results in the following inequality:

$$w_t \leq \theta[f(c_t)] - rx_t. \tag{11}$$

This constraint has two effects. First, it stops the firm from borrowing up to its limit in one period in order to distribute the funds in a subsequent period as a dividend. The second effect is to allow the firm to use its cash reserve to smooth the dividend stream. The random component of earnings, εdz_t, adds to the cash reserve when it is positive or reduces the cash reserve when negative. This process of adding to and withdrawing from the cash reserve serves to smooth the dividend paid. Dividend smoothing[11] is common amongst firms, as many firms announce dividend policy in advance and then meet the announced policy in order to avoid adverse market reactions associated with dividend surprise.

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[10] For convenience in the analysis of possible solutions, the constraint $|u_t| \leq a_t$ where $a_t = h[c_t + m_t]$ and $0 \leq a \leq \infty$, will be used. This is also consistent with the notation in Bensoussan and Lesourne (1981).

[11] See, Chen and Wu (1999) for an analysis of the interaction of earnings dynamics and dividend smoothing.

Investments in productive resources can be financed through debt, from the cash reserve, or by some combination of these. A constraint that takes these financing options into account is

$$v_t \leq m_t + \theta[f(c_t)] + u_t - rx_t - w_t. \tag{12}$$

The amount invested in productive resources is bounded by the free cash position of the firm. That is, the sum of the cash reserve, expected earnings and increases in debt, minus interest payable on debt and dividends distributed. The constraint in this form includes the cash reserve as a source of internal financing of new investments.

There are seven possible solutions to the model which define a policy of the firm, each with a bankruptcy probability expression. The solutions are derived by application of the dynamic programming algorithm. Derivation of these solutions can be found in Peat (2002). The bankruptcy conditions derived from the solution of the model are dependent on the current settings of the management decision (control) variables and how they interact with the most general expression of bankruptcy probability:

$$\Pr(M_{t+1} < 0) = \Pr\left(\Delta z < \frac{-[M_t + (\theta f(c_t) - rx_t - v_t - w_t + u_t)]}{\varepsilon}\right) \tag{13}$$

which is derived from a discretization of the continuous time state transition equation for the cash position of the firm.

The bankruptcy probability is:

- $\Pr\left(\Delta z < \frac{-[M_t + (\theta f(c_t) + (a_t - x_t) - rx_t)]}{\varepsilon}\right)$, when the firm borrows at the maximum rate and builds up its cash reserve.
- $\Pr\left(\Delta z < \frac{-[M_t + (\theta f(c_t) - x_t - rx_t)]}{\varepsilon}\right)$, when the firm is repaying debt.
- $\Pr\left(\Delta z < \frac{-[M_t + (a_t - x_t)]}{\varepsilon}\right)$, when the firm is borrowing and paying a dividend.
- $\Pr\left(\Delta z < \frac{-[M_t - x_t]}{\varepsilon}\right)$, when the firm is repaying debt and paying a dividend.
- $\Pr(\Delta z < 0)$, when the firm is borrowing and investing, repaying debt and investing or borrowing, investing and paying a dividend.

The variables that make up these expressions are summarized in Table 1.

Analysis of the model solutions suggests two groups of variables need to be considered in empirical bankruptcy prediction models. The first group are the

TABLE 1

VARIABLES OCCURRING IN BANKRUPTCY PROBABILITY EXPRESSIONS

Variable	Description
a_t	Maximum change in debt allowed under a debt to equity constraint
x_t	The debt level at time t
M_t	Cash balance at t
rx_t	Interest paid in period t where x is the debt level and r the interest rate
$\theta f[c_t]$	Expected earnings in period it
ε	The variability of earnings.

control variables of the model—dividend paid, investment level and change in the debt level—which are the decision variables of the firm's management and govern the choice of the expression for the probability of bankruptcy. The second group are those variables which appear in the expressions for the probability of bankruptcy, listed in Table 1.

IMPACT OF THE FIRM'S DECISION VARIABLES

Values of control variables, the first group of variables to be considered in the validation of the model, determine the current policy the firm is operating under. This information is important as the probabilities of bankruptcy expressions are policy specific. Combinations of the control variables—change in the level of debt, u, investment in productive resources, v, and the dividend paid, w—determine the current policy. Each of these decision variables influences the probability of bankruptcy in two ways. They have a direct impact on the cash balance through equation (13). They also have indirect effects through their impact on future productive capacity and their interactions with the constraints.

In the case of a dividend payment, the reduction in the cash position of the firm due to the payment of a dividend would suggest that the probability of default will increase with the payment of a dividend. The indirect effect of dividend payments comes from the optimizing criteria. The objective function of the firm is the maximization of the dividend stream over time. Under this objective firms that are paying dividends are behaving in an optimal way. Firms that are adjusting their cash balance are reacting to an earnings shock or have not yet reached a steady state. This suggests that payment of a dividend indicates financial stability, leading to a decrease in the probability of bankruptcy and non-payment of a dividend indicates an unstable position which results in an increase in the probability of bankruptcy. Given that the structure of the solution and the associated bankruptcy expressions are driven by the objective function and the finding in Schipper (1977), the stability argument is preferred. This implies that the ability to pay a dividend will reduce the probability of a firm going bankrupt.

Sound financial management practices dictate that firms should not undertake investments that have non-positive value, when the project cash flows have been properly defined to include the value of management flexibility. That is, the discounted stream of revenue from the project must be greater than the cost of the investment. Investments in productive resources increase the certain part of the random earnings stream, providing a larger buffer against negative earnings shocks in future periods. This indirect effect helps to reduce the probability of failure. The direct effect of the reduction of the cash reserve that results from the investment expenditure will increase the probability of bankruptcy. The addition to long term earnings that results from the investment will only occur if the firm survives the short term cash drain from the investment. Thus, the coefficient of the investment variable should be positive.

The effect of a change in the level of debt on the probability of failure will depend on whether the change is an increase or decrease in debt. A firm increasing its debt level within its debt constraint, a positive change, will be judged by lenders as being able to repay these funds. This positive assessment by lenders can be taken as a sign of financial health. The implication is that an increase in the level of debt should reduce the probability of bankruptcy in the short term. Over the longer term the increased interest commitments may increase the probability of bankruptcy. When a firm pays back debt, it does so out of its free cash. When free cash is used to repay debt it is not available for other purposes. Forgoing investments limits the pool of productive resources available in later periods. These productive resources generate the certain part of the random earnings stream. If the certain part of the random earnings is falling, the chance of a large negative earnings shock sending the firm bankrupt increases. So a decrease in debt should increase the probability of bankruptcy. Combining these two effects we can conclude that the sign of the coefficient of the change in debt will be negative. That is, an increase in debt multiplied by the negative coefficient indicates that the probability of failure is reduced. Negative changes in debt, resulting from repayments, are multiplied by the negative coefficient to produce a positive effect increasing the probability of failure.

IMPACT OF VARIABLES IN BANKRUPTCY PROBABILITY EXPRESSIONS

A list of the variables suggested by analysing the failure probability expressions can be found in Table 1.

The effect of these variables on the probability of bankruptcy can be determined through an analysis of the impact on the value of the bankruptcy probability expression for a given policy when the variable is changed, holding the value of all other variables constant. All of these expressions describe the area in the left tail of a normal probability distribution. The larger the value of the expression (Z) the smaller the left tail area, which is the probability of failure.

The cash position of the firm, M_t, is negatively related to the probability of failure. Cash holdings provide a buffer against negative values of the random component of earnings. The larger the cash holding, the greater the buffer. This buffer effect, which reduces the probability of failure, can be further explored by looking at the third failure probability expression. The larger the value of $\frac{-[M_t + (a_t - x_t)]}{\varepsilon}$, the smaller the probability of failure. Holding ε and $a - x$ constant, an increase in the cash position of the firm makes the expression $\frac{-[M_t + (a_t - x_t)]}{\varepsilon}$ larger, decreasing the area in the left tail of the distribution. The cash position of the firm has a negative relationship with the probability of bankruptcy: At the limit where total assets equal cash and productive resources are zero, profitability is limited to the return on cash holdings.

The constant, ε, defines the variability of the earnings process of the firm. This variable cannot be directly observed However, earnings surprise, εdz_t, can be computed. The constant, ε, is a function of the firm specific and economy-wide influences on the earnings of the firm. A firm with a high level of earnings uncertainty will be characterized by high values of ε. That is, a large ε is consistent with a large amount of variability in the observed earnings of the firm. In the definition of earnings a Wiener process is multiplied by the constant, ε, the product is the unexpected or surprise component of earnings. If the constant is large the possibility of a negative earnings surprise increases. A large enough negative earnings surprise will wipe out the cash holdings of the firm, leading to bankruptcy. The probability of bankruptcy increases with increases in the constant, ε. If the cash position, M_t, and change in debt, $a - x$, are held constant in the third bankruptcy probability expression, $\frac{-[M_t + (a_t - x_t)]}{\varepsilon}$, then increasing ε causes the expression to become smaller, increasing the left tail area of the probability distribution. This is consistent with earnings surprise, εdz_t, being positively associated with the probability of bankruptcy.

Interest payable on outstanding debt, rx, has to be paid from the expected part of earnings, before the firm can distribute a dividend or invest in productive resources. Interest payable is the product of the debt level and the lending interest rate. When the interest payable is larger than the expected part of earnings, it has to be funded from the cash reserve. The greater the value of interest payable, the larger the potential drain on the cash reserve. Reductions in the cash reserve decrease its ability to act as a buffer against negative values of the random component of earnings, leading to an increase in the probability of bankruptcy. This effect can be confirmed using the third bankruptcy probability expression. By keeping cash, M_t, the expected part of earnings, $\theta f[c_t]$, and the increase in debt, $a - x$, constant in the expression, $\frac{-[M_t + (\theta f(c_t) + (a_t - x_t) - rx_t)]}{\varepsilon}$, the effect of an increase in interest payable, rx_t, can be determined. An increase in interest payable, all else constant, makes the value of the expression smaller. This increases the area in the left tail of the distribution, increasing the probability of bankruptcy. Interest payable is positively related to the probability of bankruptcy.

The expected part of earnings after interest payments, $\theta f[c_t] - rx_t$, provides funds that the firm can use to distribute as a dividend, invest in productive resources, increase the cash holding or repay debt. The larger the expected part of earnings, $\theta f[c_t]$, relative to interest payable, rx_t, the greater the funds available. The availability of funds to offset negative values of the random component of earnings will decrease the probability of bankruptcy. In the expression, $\frac{-[M_t + (\theta f(c_t) + (a_t - x_t) - rx_t)]}{\varepsilon}$, let the expected part of earnings, $\theta f[c_t]$, increase while holding all other variables in the expression constant. Increases in $\theta f[c_t]$ will cause the value of the expression to increase, decreasing the area in the left tail of the distribution. The expected part of earnings, $\theta f[c_t]$, is negatively related to the probability of bankruptcy.

The effect of the level of debt, x, can be direct or indirect. The direct effect is that the higher the level of debt, the smaller the amount that can be borrowed in the future. When debt is repaid, the larger the level of debt the greater the drain on the firm's cash reserve. The impact of the level of debt on interest payments provides the indirect effect. Both effects work in the same direction. The level of debt will have a positive association with the probability of bankruptcy.

To test the usefulness of the derived bankruptcy probability expressions in empirical bankruptcy prediction, the economic variables defined in the model have to be approximated using financial statement information. The accuracy of the approximations will determine, in conjunction with the theory's external validity, the extent to which the theory is useful in practice. The proxy variables for the control variables flow directly from standard financial statements. The dividend paid, w, is measured by the actual dividend paid by the firm in the period of the financial statements. Investments in productive resources, v, are made to increase the earnings of the firm. Investing in the stock of productive resources of the company is required to allow for the generation of larger expected earnings, $\theta f[c_t]$. The productive resources of firms are recorded in the Plant, Land and Equipment account of the balance sheet. Changes in this account from one year to the next, after adjustments for depreciation charges, provide a measure of the amount that a company is investing. This number may be positive or negative in practice, depending on whether the firm is purchasing or disposing of assets. Debt is measured by the total debt of the firm, which is the sum of short term and long term borrowings. The change in the debt control variable, u, is therefore measured by the change in total debt from one balance sheet to the next.

A firm is bankrupt when its cash position, m, falls below zero. By this definition, bankruptcy is caused by the firm not having enough cash to meet current commitments. The definition of liquidity is limited in the model by a prohibition on equity raising. The cash variable used in empirical testing is the opening cash balance for the period. Negative values of the cash variable indicate the firm is facing a short term liquidity problem. The inability to meet debt servicing requirements that arise from a liquidity problem is often an important factor in the instigation of bankruptcy proceedings. The interest paid variable, rx_t, has a direct counterpart in a firm's financial statements. The amount of interest that a firm

TABLE 2

DEFINITIONS OF VARIABLES TO BE USED IN STATISTICAL TESTING

Model variable	Proxy variable constructed from financial statements
Dividend (w)	The dividend paid in period t
Investment (v)	The difference in plant, land and buildings (PLB) over the last two balance sheets, ($PLB_t - PLB_{t-1}$), adjusted for depreciation
Change in debt (u)	The difference in total debt (short term debt + long term debt) over the last two balance sheets (total debt$_t$ – total debt$_{t-1}$)
Cash (M_t)	The opening cash balance
Interest (rx)	Interest paid from the P&L
Expected earnings ($\theta f[c_t]$)	Last period's EBDIT
Earnings dispersion (ε)	A simple earnings dispersion measure, the absolute difference in EBDIT over the last two periods $\lvert EBDIT_t - EBIDT_{t-1}\rvert$
Total debt (x)	Total debt (short term debt + long term debt)

has paid is recorded in the Profit and Loss statement. This value will be used in the testing exercises.

Earnings has two components, an expected element based on a production function which maps productive resources to dollars and a random surprise component which may increase or decrease realized earnings. As Earnings Before Interest Depreciation and Taxes (EBDIT) is the item which records the results of use of productive resources in monetary terms, it will be used in the construction of the expected portion of earnings, $\theta f[c_t]$. In this work the simplest possible expectation mechanism available is used, the realized value from the previous period will be repeated in the current period. The expected part of earnings is taken to be the last period's EBDIT.

The earnings surprise, εdz_t, will have to be approximated from some combination of financial statement elements. A simple empirical dispersion measure, the absolute change in EBDIT from the last period to the current period, is used to measure earnings dispersion, ε. This measure is used for two reasons. First, the calculation of the measure only requires two sets of financial statements, so it is economical on data and, second, the measure is consistent with the definition of expected earnings.

Table 2 summarizes how these variables are operationalized using the standard financial statement variables.

All variables are divided by Total Assets, as this is a simple and consistent method of standardizing financial statement information. Using Total Assets, that is a measure of the size of a company, as a standardizing variable rules out its inclusion as an explanatory variable. As Total Assets do not appear in the expressions for bankruptcy probability in Table 1, this would not appear to present a problem in the analysis.

TABLE 3

EXPECTED EFFECT OF VARIABLES ON THE PROBABILITY OF BANKRUPTCY

Variable	Expected effect on bankruptcy probability
Dividend (w)	–
Investment (v)	+
Change in debt (u)	–
Cash (M_t)	–
Interest (rx)	+
Expected earnings ($\theta f[c_t]$)	–
Earnings dispersion (ε)	+
Total debt (x)	+

The direction of the effect of the variables on the probability of bankruptcy are summarized in Table 3.

EMPIRICAL RESULTS

The purpose of this section is to report some results from an empirical analysis of the qualitative bankruptcy probability framework developed above. This analysis is presented in three parts. The first part describes the data set used in the empirical analysis. The second section documents a comparison of the distributions of the empirical bankruptcy probabilities derived from an application of equation (13) for a sample of failed and non-failed firms. The final section reports the results of an investigation of the impact of the individual variables on estimated bankruptcy probabilities.

Data

The published financial statements of listed firms have been the source of data for the implicit classification and data reduction studies reported in the literature. Financial data for Australian firms derived from Annual Reports filed with the Australian Stock Exchange (ASX) between 1966 and 1994 are used in this study. This time frame was chosen as it covers two complete business cycles: Working over complete business cycles will mitigate the impact of unspecified macroeconomic factors. Firms are able to enter the study from the time they are listed. Each firm has one set of financial statements for each year, a P&L statement and a Balance Sheet. All sets of financial statements that are available for a firm are used in the study.

The end of a firm's lifetime can be caused by a number of different events. These include delisting caused by financial distress or the appointment of a liquidator, voluntary liquidation, takeover, or a voluntary delisting. Only firms that are surviving at the end of 1994, or have been delisted due to financial distress or appointment of a liquidator, are used in this analysis. Companies which have been delisted are flagged through the inclusion of a delisting date in their ASX company information. Those companies with a delisting date were then cross-checked against the Nothman (1999) *Record of Delistings*. Only those firms identified as being distressed or having a liquidator appointed are included. This definition of distress is a legal definition, based on the listing rules of the Australian Stock Exchange. The bankruptcy definition in the model is based on the firm's cash position. This is an economic definition based on liquidity. Severe liquidity problems in a firm are often the trigger for the appointment of liquidators, which is one of a number of first steps in the formal delisting process.

The analysis is run as time-on-study, not in calendar time. The age of a firm at the start of any observation period is the difference between the current balance sheet date and the firm's listing date. This means that firms of equal age are compared no matter what date their statements were released.[12] There are 146 delisted companies and 1,505 companies that are going concerns in the sample.

A number of variables in the model are expressed in first-difference terms. To calculate these variables, two consecutive financial statements are required. Firms not having two consecutive statements to work with have been excluded from the study. This requirement may introduce a bias. Companies which fail in the first two years of their lifetimes, that is, companies which only report once and then fail, will not appear in the study.[13]

In the sample of financial statements for the companies included in the study there are 146 records with known failure times. For the companies that are still going concerns at the study termination date, 31 December 1993, we do not know whether they fail after this date. The information on these companies is said to be right-censored. The listing date, and the date of their first financial statement included in the sample, is known for all companies. That is, there are no companies which are left-censored in the sample.

Each set of statements contains the public information about a company, until the issue of the next statement or exit of the firm from the study due to failure. The information in these statements is unknown before the statement date and not applicable following the release of the next financial statements, or delisting of the company. Observations which apply to a specific interval of time are known as interval-censored data. Intervals commence on the release of a set of financial statements. They end when a new set of financial statements is released or the company is delisted from the exchange. All the observations used in regression analysis are interval-censored. This interval-censoring allows for the introduction of time varying effects. The financial position of companies in the sample is

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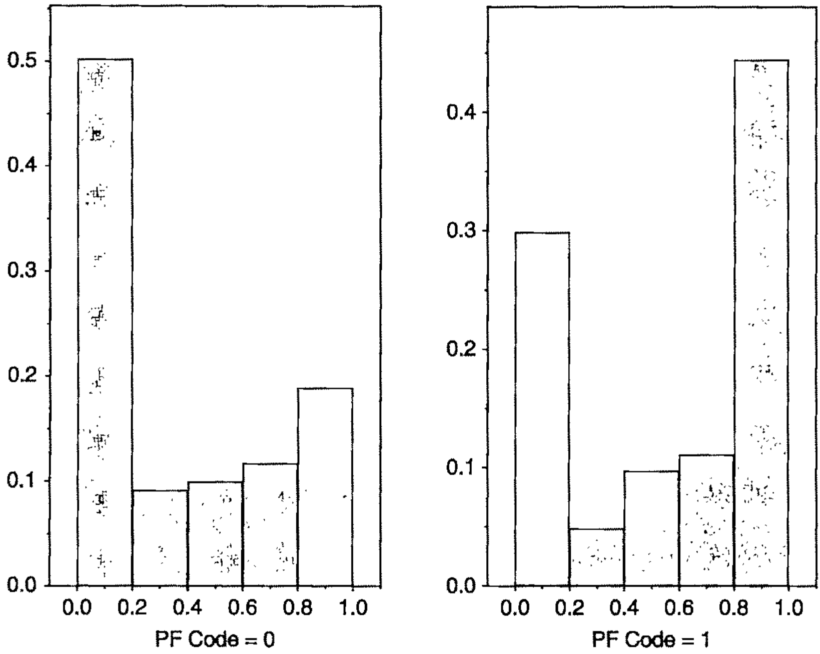
[12] For example, in 1995 a company which was listed in 1990 will have a lifetime of five years; a company listed in 1985 will have a lifetime of ten years. The 1995 statements of these companies will not be analysed together, but with other five-year-old statements and ten-year-old statements, respectively.

[13] There are fourteen firms which fail after one period identified in the sample period. This amounts to 0.008 per cent of the firms studied.

FIGURE 1

EMPIRICAL PROBABILITY DISTRIBUTIONS OF THE BANKRUPTCY PROBABILITIES CALCULATED WITH EQUATION (13), FOR NON-FAILED (CODE = 0) AND FAILED (CODE = 1) FIRMS



repeatedly measured over the period they remain on study. Each of these measures captures the firm in a different stage of evolution. The use of all the observed intervals allows the full history of the financial status of the firm to be incorporated into the statistical analysis of failure probabilities.[14]

Distributional Characteristics

In this section the distributional characteristics of the of the bankruptcy probabilities calculated by direct application of the bankruptcy expression of equation (13), using the financial statement variables described in Table 2, are explored. Empirical probability distributions of the bankruptcy probabilities, computed using the last observation for each company, are constructed for failed and continuing firms. These probability distribution functions are presented in Figure 1.

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[14] The use of repeated measures in the Cox hazard regression model is analogous to the analysis of Panel Data by regression analysis. Chapter 12 of Johnston and DiNardo (1997) describes regression methods for panel data. It is also consistent with the discrete hazards approach adopted by Shumway (2000).

In the case of the continuing firms (Code 0), the distribution is left skewed, with 50 per cent of the observations falling in the range (0, 0.2). This distribution is constant with the belief that continuing firms will have low bankruptcy probabilities. The distribution of probabilities for the failed firms, (Code 1), is bimodal, with 45 per cent of observations falling in the (0.8, 1) range and 30 per cent in the (0, 0.2) range. Casual inspection suggests that these groups of firms have different probability distributions. The results of a two sample Kolmogorov-Smirnov test (KS statistic = 0.2694, p-value = 0), confirm a significant difference in the two distributions of bankruptcy probabilities. This section demonstrates that the bankruptcy probabilities of failed and continuing firms come from different distributions. The next section will investigate the impact of the variables specified in Table 2 on the probability of bankruptcy.

Analysis of Explanatory Variables

The distributional results presented in the last section show that the empirical bankruptcy probabilities for the two groups are significantly different. In this section a statistical analysis is carried out to test the hypothesized effects of the variables specified on the probability of bankruptcy. The utility of the explicit approach will be evaluated in a regression framework by adding the variables from the Altman (1968) multiple discriminant model and testing whether the added variables provide any new information.

The statistical analysis commences by investigating the univariate distributional characteristics of the variables defined in Table 2. The results are presented for both failed and continuing firms in Table 4.

All the variables display evidence of non-normality, having non-zero skew and excess kurtosis. The relative size of the group means is related to the expected direction of the effect of the variable on the probability. If the mean of the failed group is higher than that of the continuing group it indicates that the failed companies have larger values of the factor. The variable will therefore have a positive effect on the probability of failure, all else remaining constant. Variables which have higher means for the continuing group will have a negative effect on the bankruptcy probability. The group means in Table 4 suggest the following effects on bankruptcy probability; dividends will have a negative impact, investment will have a positive impact, change in debt will have a negative impact, Interest payments will have a positive impact, total debt will have a positive impact, cash will have a negative impact, earnings dispersion will have a negative effect and expected earnings will have a positive effect. The Wilcoxson score and its p-value are the result of a non-parametric test for a significant difference between the group means. Variables with significant differences within their group means will be expected to add information to a regression analysis. All variables other than cash display a significant difference.

The variables are now tested in a multivariate probabilistic regression framework. The time varying hazard approach proposed by Shumway (2001) and used by Hillegeist *et al.* (2004) is adapted for use in this study. Due to the documented non-normality of the variables being analysed the logistic regression proposed by

TABLE 4

UNIVARIATE ANALYSIS OF PROPERTIES OF VARIABLES THAT INFLUENCE BANKRUPTCY PROBABILITIES

	Dividend	Investment	Change in debt	Interest	Total debt	Cash	Dispersion	Expected earnings
Continuing								
Min	0.000	0.000	−5407.903	0.000	0.000	0.000	0.000	−10340.490
Mean	0.022	0.061	−16.003	0.027	0.372	8.256	18.898	−6.356
Median	0.014	0.027	0.000	0.018	0.201	0.036	0.042	0.093
Max	3.889	0.943	115.686	4.013	314.667	3576.627	10340.190	2784.474
Std dev.	0.073	0.095	153.510	0.070	4.823	70.457	218.715	219.508
Skewness	41.508	3.325	−25.586	34.377	48.981	25.923	31.278	−30.396
Kurtosis	2145.760	16.142	820.761	1690.121	2790.813	1118.908	1244.157	1233.849
Failed								
Min	0.000	0.000	−1328.370	0.000	0.000	0.000	0.000	−189.580
Mean	0.014	0.072	−37.726	0.093	0.605	1.256	9.447	3.285
Median	0.000	0.009	−0.043	0.036	0.332	0.052	0.084	0.063
Max	0.149	0.833	0.835	2.760	20.156	35.437	184.101	140.548
Std dev.	0.026	0.131	154.377	0.275	1.867	4.410	27.969	30.251
Skewness	2.922	2.916	−6.041	7.156	8.854	5.081	3.707	−0.584
Kurtosis	9.479	10.550	42.229	60.732	85.375	29.938	15.324	17.142
Wilcoxon score	4.742	1.860	4.684	6.848	−5.686	−1.389	−4.272	2.025
p-value	0.000	0.063	0.000	0.000	0.000	0.165	0.000	0.043

Note: Descriptive statistics grouped by firm status; Wilcoxon score from a non-parametric test of equality of group means.

Shumway will be replaced by the semi-parametric Cox regression framework. The treatment of the data and estimation of a discrete hazard function are not affected by this change of regression method.

The results of the estimation of the hazard function are shown in Table 5. The likelihood ratio test indicates that at least one of the coefficients is significantly different from zero. The signs of the coefficients, which indicate the effect of the variable on the probability of bankruptcy, are consistent with the conclusions of the univariate analysis of the estimation sample. The significance of the coefficients indicates that interest payments, the cash position and the change in debt have the greatest effect on the probability of bankruptcy. The sign of the coefficients of the dispersion and expected earnings measures differ from their expected values presented in Table 3. This anomalous result will be discussed in the conclusion.

The final regression test aims to evaluate the usefulness of the explicit method. The explanatory variables from the Altman (1968) multiple discriminant model—working capital / total assets, retained earnings / total assets, the market value of equity / total debt and sales / total assets—are added to the regression model. The

TABLE 5

PARAMETER ESTIMATES FOR A DISCRETE HAZARD FUNCTION

	coeff.	robust se	z	p
Dividend	−11.015005	5.935818	−1.856	0.063
Investment	1.011681	0.700981	1.443	0.150
Change in debt	−0.001576	0.000521	−3.025	0.003
Interest	1.043252	0.240913	4.33	0.000
Total debt	0.003903	0.003424	1.14	0.250
Cash	−0.017108	0.004978	−3.437	0.001
Dispersion	−0.000847	0.001935	−0.437	0.660
Expected earnings	0.002732	0.001341	2.038	0.042
	$n = 6{,}264$			
	Likelihood ratio test = 39.9 on 8 df, p = 3.4e–006			

Parameter values from a discrete hazard function estimated with the Cox regression model. The robust standard error corrects for multicolinearity. The z value is the test statistic for the hypothesis that the coefficient is zero. The p-value is the tail probability for the hypothesis that the coefficient is zero.

incremental information content of theses variables is evaluated using the likelihood ratio testing methodology employed in Hillegeist (2004) to compare an empirical option based model of bankruptcy probabilities with one augmented with an Altman z-score variable. The value of the likelihood ratio test is 8.957042, the ratios being derived from a Chi-squared distribution, with the number of degrees of freedom being the number of added variables. The p-value of the statistic is 0.9378, which indicates that the added variables do not improve the fit of the original regression based on the explicit model.

This statistical analysis in this section has demonstrated that while the univariate and regression analyses of the impact of the variables specified are in agreement, the behaviour of the empirical measures of expected earnings and earnings dispersion is at variance with the behaviour predicted. The failure of the implicit variables from the Altman model to provide incremental information confirms the usefulness of the explicit approach.

CONCLUSION

The incremental information analysis which concludes the previous section demonstrates the utility of the *explicit* approach to bankruptcy probability modelling. This augments much of the implicit literature which fails to develop a theory of bankruptcy. The univariate and regression results are summarized in Table 6. The results for the expected earnings and earnings dispersion measures warrant further comment.

The explicit approach requires the development of an economic framework of the firm and its management decisions. The solution of this economic model provides

TABLE 6

SUMMARY OF OBSERVED EFFECTS OF VARIABLES ON BANKRUPTCY PROBABILITY

Variable	Expected effect on bankruptcy probability	Observed effect
Dividend (w)	–	–
Investment (v)	+	+
Change in debt (u)	–	–
Cash (M_t)	–	–
Interest (rx)	+	+
Expected earnings ($\theta f[c_t]$)	–	+
Earnings dispersion (ε)	+	–
Total debt (x)	+	+

Hypothesized effects of variables inferred from the optimizing model compared to the observed effect in univariate and hazard regression analysis.

qualitative insight into the factors which impact on a firm's probability of bankruptcy. The challenge for accounting is the provision of a system of measurement which is consistent with the economics of the decision model developed to support the financial analysis process. The model developed here includes a decomposition of earnings into expected and unexpected components, the unexpected component being a function of the variability of the firm's earnings. Current accounting practice provides no measure which corresponds to these economic variables. Generally accepted practice measures earnings by subtracting costs of production from realized revenue. There is no concept of expected earnings or earnings dispersion. The measures used in the statistical analysis embody the simplest possible implementation of the variables. These simple measures do not interact with the estimated bankruptcy probabilities in the expected manner. Further research into the measurement and decomposition of earnings is critical to the evolution towards an explicit approach to the estimation of bankruptcy probabilities. This article has demonstrated the usefulness of the explicit approach, and the challenges to accounting measurement that it raises.

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Discussion of Peat

In a general sense, bankruptcy prediction modelling based on accounting numbers is quite straightforward. The main ingredients in a statistical approach to estimate such models consist of a sample of bankrupt and non-bankrupt companies, accounting numbers from financial statements prior to the bankruptcy event, and some statistical model allowing for a stochastic relationship between the dependent variable ('bankruptcy' versus 'non-bankruptcy') and the accounting numbers. However, as most researchers in the area have experienced, several more or less open-ended questions soon tend to surface. One of these questions, concerning the choice and specification of the independent variables, is re-addressed in the article by Peat (2007). This is clearly a worthwhile and legitimate purpose, in particular as the author has chosen a new 'managerial decision based approach' in order to provide a well-founded rationale for the suggested variables. In principle, the chosen methodology holds promise for the derivation of something as unique as a theory-based probabilistic bankruptcy prediction model.

VALIDITY AND SPECIFICATION OF THE BANKRUPTCY PREDICTION MODEL

According to Peat, the choice of independent variables in a bankruptcy prediction model can follow either an 'implicit' or 'explicit' approach. The former approach has clearly been more common in previous research, consistent with the idea of letting the 'data speak for themselves' rather than being restricted by some preconceived theoretical model. Obviously an approach of this kind does not provide much insight as to the underlying rationale for a company to go bankrupt. An 'explicit' approach as proposed by Peat—'proceeding from a model of the behaviour of the firm to the prediction of some aspect of the firm's financial performance'—might certainly enhance our understanding of the underlying phenomena that precede bankruptcy.

In the spirit of the 'explicit' approach, Peat specifies a dynamic firm model. The model includes both management control variables (investments in productive assets, dividend payments, and borrowing/repayment of debt) and exogenous state/event variables (e.g., book value of owners' equity, debt, cash balance, earnings and cash flow). The objective of the firm is to maximize the present value of

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expected future dividends to company shareholders. In order to generate future earnings, the management makes investments in productive assets (c_t), where the investments can be financed with the cash balance (m_t) and/or additional borrowing (u_t). The realization of future earnings is uncertain—in each period an earnings surprise modelled as $\varepsilon \cdot dz_t$ (ε = diffusion coefficient and dz_t following a Wiener process) can occur. If the earnings surprise is negative, the cash balance is negatively affected, and if the resulting position is negative the company goes bankrupt.

As instructive and illustrative as the firm model is, it invokes strong simplifications of management decision choices, earnings uncertainty, and also the characterization of the bankruptcy event. As in most economic modelling, the crucial issue is then whether the simplifications permit plausible conclusions about the likelihood of bankruptcy. In this regard, it would have been helpful if Peat could have relaxed the following assumptions:

- *The triggering condition for bankruptcy is a negative cash position.* A weak cash position does not prevent a company from turning to the equity or bond market and asking for more investor capital. For example, if the value of a new issue of owners' equity is larger than the required cash addition, equity investors would certainly be interested in preventing the company from going bankrupt.
- *Company managers can make disinvestments of productive assets without dead-weight losses, but cannot change the operating risk of the firm.* Previous research (e.g. Beaver, 1966; Blum, 1974; Zavgren, 1985; or Skogsvik, 1990) has shown that bankruptcy typically does not strike like a bolt from the blue, but that companies rather are plagued by financial problems over several years before the bankruptcy event occurs. Peat's model allows for disinvestments of productive assets, however naively presuming that the full book value (= non-depreciated or non-amortized acquisition cost) can be recovered at all points in time. Also, the model does not allow managers to reduce the operating risk of the company, as the earnings surprise term $\varepsilon \cdot dz_t$ appears to be unrelated to the management's choice of cash and productive assets in the firm.

Furthermore, the exposition of the firm model could have been more explanatory with regard to the purpose at hand, for example:

- How do the control variables affect the goal function of the firm (the maximization of the present value of expected dividends)? What will managers do to maximize the goal function, and how does this affect the risk of getting a negative cash balance (i.e., the bankruptcy risk)?
- What kind of insight does Peat's firm model provide? In particular, in what sense does the model give us additional knowledge as compared to previous explicit modelling of bankruptcy (as in Wilcox, 1971, 1976; or Scapens *et al.*, 1981)?

Solving the firm model for the probability of the cash balance to become negative, Peat provides a general bankruptcy probability model—expression (13)—and five specific solutions. The specific solutions are distinguished by different management decisions regarding investments, dividend payments, and/or borrowing/repayment of debt. The virtue of this exposition is doubtful, as expression (13) really is sufficient to understand the impact of various combinations of the control variables. Also, the solutions according to the third, fourth and fifth bullet-points on p. 311 appear to be incomplete: Variables/parameters seem to be missing in the numerators of the specified probabilities.

One might also wonder whether a 'dynamic, stochastic, constrained value-maximizing model of a firm' really is necessary to come up with the prediction model in (13). The expression is just based on the linkage between the opening and closing cash balance in a certain period, where the only stochastic ingredient is a random earnings surprise ($\varepsilon \cdot dz_t$). An insight of this kind can easily be obtained without having much knowledge of Peat's elaborate firm model.

A final comment on the validity of the firm model relates to the timing of the control variables and the state/event variables. One might expect that the management decides about investments and borrowing/lending in the beginning of a period, and that the earnings surprise is revealed during the period. Regarding the payment of company dividends, the management reasonably makes this choice towards the end of the period, after having observed the earnings surprise. Unfortunately, it is not clear to the reader whether these suggestions are in alignment with Peat's model.

EMPIRICAL OPERATIONALIZATIONS OF THE FIRM MODEL

Peat discusses both the impact of the control variables and the state/event variables on the bankruptcy probability. The discussion of the state/event variables is straightforward in the sense that the expected associations are consistent with the sign of each variable in expression (13). For example, the coefficient of the cash balance[1] at time t is negative in (13), implying that an increase of m_t (*ceteris paribus*) is expected to have a negative effect on the bankruptcy probability.

Based on the coefficients of the control variables in (13), one would expect that investments in productive assets (ν_{t+1}) and dividend payments (ω_{t+1}) are positively related while an increase in debt (u_t) is negatively related to the bankruptcy probability. However, a negative relationship is proposed for the dividend variable. This goes beyond what can be concluded from (13), indicating that the variable in some way is associated with future earnings and/or the uncertainty of future earnings. This should have been clarified—preferably in the specification of the underlying firm model. Generally speaking, the discussion regarding 'direct' and 'indirect' effects of the management control variables is unconvincing.

Additional remarks can be made concerning the operationalization of the control variables and the state/event variables. First, the timing of the variables remains problematic. In expression (13), Cash (M_t) refers to the end of the last period while Expected earnings ($\theta \cdot f(c_t)$), Interest ($r \cdot x_t$) and the control variables refer to the next period ($t + 1$).[2] Financial statement information of this kind is hardly ever available for the period when companies go bankrupt. One might speculate that Peat instead has collected values for the latter variables from the period immediately preceding the bankruptcy period. A mismatch of this kind will reduce the validity of Peat's operationalization of the firm model, which in turn can be expected to weaken the empirical importance of the variables.

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[1] For some reason, the cash balance variable is denoted m_t in the theoretical model, but M_t in the empirical application of the model.

Apart from the timing problem observed above, the assessment of the management control variables appears to be reasonable. The event variables Expected earnings ($\theta \cdot f(c_t)$) and Earnings dispersion (ε) are obviously much more difficult to measure. Peat has chosen very simple assessments of these variables ($EBDIT_t$ for the previous period, and $|EBDIT_t - EBDIT_{t-1}|$ over the last two periods, respectively). As the variables are likely to be important bankruptcy 'drivers' in the firm model, their measurement should preferably have been done in a more careful manner.

EMPIRICAL RESULTS AND SUGGESTED CONCLUSIONS

The empirical results are based on a substantial sample of bankrupt (146) and non-bankrupt (1,505) Australian companies, with data from the period 1966–94. The results are presented in three steps—first, bankruptcy probabilities are calculated in accordance with the theory-based prediction model in (13); second, a probabilistic Cox regression model including all variables from the firm model is estimated; and third a Cox regression model extended by independent variables from Altman (1968) is examined.

The first type of empirical observations follows from the theory-based model that Peat has derived, as expression (13) allows for direct assessments of bankruptcy probabilities as Δz assumedly is normally distributed. This is clearly an interesting and original contribution that follows from the explicit modelling being developed by Peat. The probability distribution in Figure 1 of the article corroborates the validity of the prediction model, as most of the probability density is close to 1 for the sample of bankrupt companies and close to 0 for the sample of non-bankrupt companies. Somewhat surprisingly though, a non-negligible probability density for the bankrupt companies falls in the range of (0, 0.2). It would be interesting to learn more about this somewhat anomalous result.

The specification of the probabilistic regression test in the second step is rather obscure to the reader—partly due to the above noted timing problem of the independent variables, but also due to a general lack of precision in the presentation. With regard to the evaluation of the estimated coefficients, the results in Table 1 below deserve to be discussed.

Comparing the estimated coefficients to the theory-based prediction model in (13), Table 1 shows that the coefficients of three variables have the expected sign, three variables have non-significant coefficients, and two variables have a sign

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[2] That is, the period for which the probability of bankruptcy is assessed.

TABLE 1

EXPECTED AND ESTIMATED COEFFICIENTS OF CONTROL AND STATE/EVENT VARIABLES IN PEAT (2007)

Independent variable	Expected sign of coefficient		Outcome
	According to expression (13)	Proposed by Peat	Estimated coefficient
Control variables			
Investment (v_t)	+	+	(≈0)
Change in debt (u_t)	–	–	$-^{***}$
Dividend (ω_t)	+	–	$-^{*}$
State/event variables			
Cash (M_t)	–	–	$-^{***}$
Interest ($r \cdot x_t$)	+	+	$+^{***}$
Exp. earnings ($\theta \cdot f(c_t)$)	–	–	$+^{**}$
Earnings dispersion (ε)	+	+	(≈0)
Total debt (x_t)	(n.a.)	+	(≈0)

Note: */**/*** = coefficient significant with $\alpha = 0.10/0.05/0.01$; n.a. = not applicable.

that is opposite to what is expected.[3] This rather weak result reflects negatively on the validity of Peat's model, but one must at the same time acknowledge that there is room for much more fine-tuning of the operationalization of the model.

The non-significant coefficient for the independent variable Total debt (x_t) in Table 1 is surprising. The result stands in sharp contrast to previous empirical research (e.g., Beaver, 1966; Altman, 1968; or later efforts such as Ohlson, 1980, or Skogsvik, 1990). Presumably it is caused by a strong positive correlation between the variables. Interest ($r \cdot x_t$) and Total debt (x_t), rendering the latter variable non-significant. It should also be noted (as indicated in the table), that company debt is *not* included in the theory-based bankruptcy prediction model in (13). Hence it is somewhat strange that Peat has chosen to include this variable in the empirical tests.

The regression analyses in the third step show that the information content of the independent variables from the firm model appear to subsume the added variables from Altman's *z*-score model. This corroborates the validity of Peat's prediction model, but obviously a test of this type would have been more interesting if a more ambitious search for potentially missing variables—based on more contemporary articles, with larger samples and more rigorous statistical methods—had been carried out.

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[3] Note that Peat claims that the firm model implies that the coefficient of the dividend variable should be negative. As noted previously, it is doubtful whether this follows from the model.

CONCLUDING REMARKS

A well-recognized problem concerning the choice and specification of independent variables in bankruptcy prediction modelling is revisited in Peat. The main contribution of the article is a new theory-based bankruptcy prediction model, derived from some basic decision problems that company managers face. The independent variables in the model are subsequently operationalized and evaluated for a large sample of bankrupt and non-bankrupt Australian companies.

The 'explicit' modelling approach as proposed by Peat clearly provides additional structure to the problem of selecting independent variables in statistically estimated bankruptcy prediction models. However, the approach is plagued by several non-trivial simplifications and difficult assessments, making it hard to determine whether the theory-based model is sufficiently robust to be helpful in empirical research. Furthermore, there are a few unclear specification issues in the firm model that should be addressed in order to make the approach more convincing. It would also be interesting to learn more about the proposed advantages of the 'managerial decision based approach' for the specification of a prediction model. Reading the article, it is hard to see how the managerial control variables affect bankruptcy risk. It might be argued that bankruptcy prediction rather is an empirical issue, more suited for a statistical 'implicit' approach than a preconceived 'explicit' model of a value-maximizing firm.

The empirical results in Peat's article include a couple of novel observations. A negative statistical association between company dividends and bankruptcy risk is observed, a result that has not received much attention in previous empirical research. The statistical association between the earnings expectation variable and bankruptcy risk is also interesting, even though the positive coefficient is not warranted by the theory-based model.[4]

Peat does not report any prediction results. This is a deficiency that makes it hard to assess the forecasting quality of the proposed model. It would certainly have been interesting to compare prediction results for Peat's model with results (using the same sample of Australian companies) based on the 'implicit' modelling approach. Hence the question remains: Is the 'managerial decision based approach' really superior to a more traditional 'implicit' statistical approach in bankruptcy prediction modelling?

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EDWARD I. ALTMAN AND GABRIELE SABATO

Modelling Credit Risk for SMEs: Evidence from the U.S. Market

Considering the fundamental role played by small and medium sized enterprises (SMEs) in the economy of many countries and the considerable attention placed on SMEs in the new Basel Capital Accord, we develop a distress prediction model specifically for the SME sector and to analyse its effectiveness compared to a generic corporate model. The behaviour of financial measures for SMEs is analysed and the most significant variables in predicting the entities' credit worthiness are selected in order to construct a default prediction model. Using a logit regression technique on panel data of over 2,000 U.S. firms (with sales less than $65 million) over the period 1994–2002, we develop a one-year default prediction model. This model has an out-of-sample prediction power which is almost 30 per cent higher than a generic corporate model. An associated objective is to observe our model's ability to lower bank capital requirements considering the new Basel Capital Accord's rules for SMEs.

Key words: Basel II; Capital requirements; Finance; Modelling credit risk; SME.

Small and medium sized enterprises are reasonably considered the backbone of the economy of many countries. For OECD members, the percentage of SMEs out of the total number of firms is greater than 97 per cent. In the U.S., SMEs provide approximately 75 per cent of the net jobs added to the economy and employ around 50 per cent of the private workforce, representing 99.7 per cent of all employers.[1] Thanks to the simple structure of most SMEs, they can respond quickly to changing economic conditions and meet local customers' needs, growing sometimes into large and powerful corporations or failing within a short time of the firm's inception.[2] From a credit risk point of view, SMEs are different from large corporates for many reasons. For example, Dietsch and Petey (2004) analyse a set of German and French SMEs and conclude that they are riskier but have a lower asset correlation with each other than large businesses. Indeed,

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[1] Statistics provided by the *United States Small Business Administration*, www.sba.gov. Similar data apply in other countries, like Australia.

[2] See, for example, OECD outlook on SMEs (2002).

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we hypothesize that applying a default prediction model developed on large corporate data to SMEs will result in lower prediction power and likely a poorer performance of the entire corporate portfolio than with separate models for SMEs and large corporates.

The main goal is to analyse a complete set of financial ratios linked to U.S. SMEs and to identify the most predictive variables affecting an entity's credit worthiness. One motivation is to show the significant importance for banks of modelling credit risk for SMEs separately from large corporates. The only study that the authors are aware of that focused on modelling credit risk specifically for SMEs is a fairly distant article by Edmister (1972). He analysed nineteen financial ratios and, using multivariate discriminant analysis, developed a model to predict small business defaults. His study examined a sample of small and medium sized enterprises over the period 1954–69. We expand and improve his work using, for the first time, the definition of SME as contained in the new Basel Capital Accord (sales less than €50 million) and applying a logit regression analysis to develop the model. We extensively analyse a large number of relevant financial measures in order to select the most predictive ones. Then, these variables are used as predictors of the default event. The final output is not only an extensive study of SME financial characteristics, but also a model to predict their probability of default (PD), specifically the one year PD required under Basel II.[3] The performance of this model is also compared with the performance of a well-known generic corporate model (known as Z''-Score[4]) in order to show the importance of modelling SME credit risk separately from a generic corporate model. We acknowledge that our analysis could still be improved using qualitative variables as predictors in the failure prediction model to better discriminate between SMEs (as recent literature, e.g., Lehmann, 2003, and Grunet *et al.*, 2004, demonstrates). The COMPUSTAT database used, however, does not contain qualitative variables. Nevertheless, the performance accuracy of the model used to predict SME default is significantly high both on an absolute and relative basis.[5]

While there have been many successful models developed for corporate distress prediction purposes, and at least two are commonly used by practitioners on a regular basis, none was developed specifically for SMEs.[6] In addition, those original

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[3] Basel Committee on Banking Supervision, June 2004.

[4] This is a model for manufacturing and non manufacturing firms, see Altman and Hotchkiss (2005). This model is of the form $Z''\text{-Score} = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4$, where:

X_1 = working capital/total assets,
X_2 = retained earnings/total assets,
X_3 = EBIT/total assets, and
X_4 = book value equity/total assets.

[5] COMPUSTAT North America (Standard & Poor's Corp., a division of McGraw-Hill Corp.) is a database of U.S. and Canadian financial and market information on more than 24,000 active and inactive publicly held companies.

[6] We refer to the KMV model, now owned and marketed by Moody's/KMV, and the Altman Z-Score model (available from Bloomberg, S&P's Compustat and several other vendors).

Z-Score models (developed by one of the authors) can be improved upon by transforming several of the variables to adjust for the changing values and distributions of several of the key variables of those models. In particular, a parsimonious selection of variables, some of which are transformed, can compensate for the fact that our model cannot make use of qualitative variables that are available only from banks' and other lending institutions' files.[7]

The analysis is carried out on a sample of 2,010 U.S. firms (with sales less than \$65 million) including 120 defaults, spanning the time period 1994 to 2002.[8] This is followed by a survey of the most relevant literature about failure prediction methodologies. First, the choice of using a logistic regression to develop a specific SME credit risk model is addressed and justified; then follows an overview and analysis of the findings of the most recent studies about SMEs. The next section develops a model to predict one-year SME default. We examine different statistical alternatives to improve the performance of our model and compare the results. Results using a logistical technique are contrasted with other alternatives, principally discriminant analysis. The following section emphasizes the value of developing a specific model in order to estimate SME one-year probability of default. In particular, the benefits, in terms of lower capital requirements for banks of applying a specific SME model are shown. We demonstrate that improving the prediction accuracy of a credit risk model is likely to have beneficial effects on the Basel II capital requirements for SMEs when the Advanced Internal Rating Based (A-IRB) approach is used and, as such, could result in lower interest costs for SME customers.

REVIEW OF THE RELEVANT RESEARCH LITERATURE

This Section reviews some of the most important works about failure prediction methodologies. After first analysing the most popular alternative statistical techniques that can be used to develop credit risk models, focus switches to the works that have investigated the problem of modelling credit risk for small and medium sized firms.

Default Prediction Studies

The literature about default prediction methodologies is substantial. Many authors during the last forty years have examined several possible realistic alternatives to predict customers' default or business failure. The seminal works in this field were

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[7] We are aware that most large banks have recently been motivated to develop models specifically for SMEs since the new Basel Accord explicitly differentiates capital requirements between large corporates and SMEs.

[8] This sales limit of \$65 million (the equivalent of €50 million) comes from the new Basel Capital Accord's definition of an SME (June 2004). Perhaps, \$50 million in the U.S. and (say) A\$50 million in Australia will be the definitions to be implemented in those countries. In our precedent work (Altman and Sabato, 2005), we have analysed the different SME definitions for Europe, the U.S. and Australia and explored the expected capital requirements for SMEs under the Basel II Accord. We believe that banks now consider the Basel II definition as prominent.

Beaver (1967) and Altman (1968), who developed univariate and multivariate models to predict business failures using a set of financial ratios. Beaver (1967) used a dichotomous classification test to determine the error rates a potential creditor would experience if firms were classified on the basis of individual financial ratios as failed or non-failed. He used a matched sample consisting of 158 firms (79 failed and 79 non-failed) and he analysed fourteen financial ratios. Altman (1968) used a multiple discriminant analysis technique (MDA) to solve the inconsistency problem linked to Beaver's univariate analysis and to assess a more complete financial profile of firms. His analysis drew on a matched sample containing sixty-six manufacturing firms (33 failed and 33 non-failed) that filed a bankruptcy petition during the period 1946–65. Altman examined twenty-two potentially helpful financial ratios, eventually selecting five as providing in combination the best overall prediction of corporate bankruptcy.[9] The variables were classified into five standard ratios categories, including liquidity, profitability, leverage, solvency and activity ratios.

For many years thereafter, MDA was the prevalent statistical technique applied to the default prediction models. It was used by many authors (Deakin, 1972; Edmister, 1972; Blum, 1974; Eisenbeis, 1977; Taffler and Tisshaw, 1977; Altman *et al.*, 1977; Bilderbeek, 1979; Micha, 1984; Gombola *et al.*, 1987; Piesse and Wood, 1992; Lussier, 1995; Altman *et al.*, 1995). However, in most of these studies authors pointed out that two basic assumptions of MDA are often violated when applied to the default prediction problems.[10] Moreover, in MDA models, the standardized coefficients cannot be interpreted like the slopes of a regression equation and hence do not indicate the relative importance of the different variables. Considering these MDAs' problems, Ohlson (1980), for the first time, applied the conditional logit model to the default prediction's study.[11] The practical benefits of the logit methodology are that they do not require the restrictive assumptions of MDA and allow working with disproportional samples. Ohlson used a data set with 105 bankrupt firms and 2,058 non-bankrupt firms gathered from the COMPUSTAT database over the period 1970–76. He based the analysis on nine predictors (seven financial ratios and two binary variables), mainly because they appeared to be the ones most frequently mentioned in the literature. The model's performance, in terms of classification accuracy, was lower than that reported in the previous studies based on MDA (Altman, 1968; Altman *et al.*, 1977). But reasons were provided as to why logistic analysis was preferable.

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[9] The original Z-Score model (Altman, 1968) used five ratios: working capital/total assets, retained earnings/total assets, EBIT/total assets, market value equity/BV of total debt and sales/total assets.

[10] MDA is based on two restrictive assumptions: (a) the independent variables included in the model are multivariate normally distributed; (b) the group dispersion matrices (or variance-covariance matrices) are equal across the failing and the non-failing group. See Barnes (1982), Karels and Prakash (1987) and McLeay and Omar (2000) for further discussions about this topic.

[11] Zmijewski (1984) was the pioneer in applying probit analysis to predict default, but, until now, logit analysis has given better results in this field.

From a statistical point of view, logit regression seems to fit well the characteristics of the default prediction problem, where the dependent variable is binary (default/non-default) and with the groups being discrete, non-overlapping and identifiable. The logit model yields a score between zero and one, which conveniently gives the probability of default of the client.[12] Lastly, the estimated coefficients can be interpreted separately as the importance or significance of each of the independent variables in the explanation of the estimated PD. After the work of Ohlson (1980), most of the academic literature (Zavgren, 1983; Gentry *et al.*, 1985; Keasey and Watson, 1987; Aziz *et al.*, 1988; Platt and Platt, 1990; Ooghe *et al.*, 1995; Mossman *et al.*, 1998; Charitou and Trigeorgis, 2002; Becchetti and Sierra, 2002) used logit models to predict default. Despite the theoretic differences between MDA and logit analysis, studies (see, e.g., Lo, 1985) show that empirical results are quite similar in terms of classification accuracy. Indeed, after careful consideration of the nature of the problems and of the purpose of this study, we have decided to choose the logistic regression as an appropriate statistical technique. For comparison purposes, however, we also analyse results using MDA.

SME Studies

More recently, the new Basel Accord for bank capital adequacy (Basel II) has seen many analysts focus on the SME segment (see e.g., Schwaiger, 2002; Saurina and Trucharte, 2004; Udell, 2004; Jacobson *et al.*, 2005; and Altman and Sabato, 2005; Berger, 2006). Actually, criticisms have been raised by governments and SME associations that high capital charges for SMEs could lead to credit rationing of small firms and, given the importance of these firms in the economy, could reduce economic growth. The aforementioned studies have dealt with the problem of the possible effects of Basel II on bank capital requirements, but the problem of modelling credit risk specifically for SMEs has either not been addressed or only briefly considered. Other authors have focused on the difficulties and the potentials of small business lending, investigating the key drivers of SME profitability and riskiness for U.S. banks (Kolari and Shin, 2004) or the lending structures and strategies (Berger and Udell, 2004). Recently, Berger and Frame (2005) have analysed the potential effects of the small business credit scoring on credit availability. They find that banking organizations that implement automated decision systems (such as scoring systems) increase small business credit availability. They focus on micro business credits (up to $250,000) that were managed with credit scoring from the latter half of 1990s in the U.S. using personal credit history of the principal owner provided by one or more of the consumer credit bureaus (e.g., Equifax, Experian, FICO). However, today banks need to be able to manage as retail clients SMEs with an annual turnover up to at least €1 million (if they want to consider the Basel II definition) to be competitive in the credit business.[13] We think that, excluding self employed and sole trader micro business, the complexity of the other bigger companies cannot be managed only with bureau information, but a financial analysis is needed.

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[12] Critics of the logit technique, including one of the authors of this paper, have pointed out the specific functional form of a logit regression can lead to bimodal (very low or very high) classification and probabilities of default.

Following the works of a large number of authors (including Kolari and Shin, 2004, and Berger, 2004), we conclude that small business lending has a strong positive effect on bank profitability. But we find, in contrast with Kolari and Shin, that lending to SMEs is riskier than to large corporates (see also Saurina and Trucharte, 2004; Dietsch and Petey, 2004). As a consequence, we demonstrate that banks should develop credit risk models specifically addressed to SMEs in order to minimize their expected and unexpected losses. Many banks and consulting companies already follow this practice of separating large corporates from small and medium sized companies when modelling credit risk. But the academic literature lacks a definitive study that demonstrates the significant benefits of such a choice.[14] The Edmister (1972) study had focused only on the selection of the financial ratios that can be useful in predicting SME failure. It did not explain why small firms should be separated from large companies. The emphasis on SME credits in today's environment is far more prominent and we show that modelling specific SME credit risk systems is likely, under certain scenarios, to lead to lower capital requirements when the new Basel Capital Accord will be implemented in 2008.[15]

SME MODEL DEVELOPMENT

This section develops a specific model to estimate one-year SME probability of default. We illustrate the steps of our analysis and compare the results obtained using different statistical instruments (such as log transformations of the variables). Statistical details about the developed models can be found in the appendixes.

The Data Set

The statistical analysis utilizes a sample containing financial data for 2,010 U.S. SMEs with sales less than $65 million (approximately €50 million), gathered from WRDS COMPUSTAT database over the period 1994–2002. To create this sample, we first assess the number of defaulted firms contained in the COMPUSTAT database during the selected period and we find 120 defaulted SMEs (with

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[13] We are aware of some large, international banks (such as Barclays) that are managing SMEs as retail clients using automated scoring systems for credits up to €3 million.

[14] Bradbury (1992) analyses the same problem and reaches our conclusion, that is, SMEs need specific models different from the large corporate ones. However, he uses a small matched sample containing forty New Zealand SMEs with a very small size (average total assets about €100,000).

[15] A recent directive extended the introduction in the U.S. one year beyond 2007; 2007 is still the expected implementation date in Europe.

TABLE 1

CONSTRUCTION OF THE DATA SET FOR THE U.S. SMES

Year	Defaults	Non-defaults	Total
1994	6	95	101
1995	10	158	168
1996	16	252	268
1997	17	268	285
1998	13	205	218
1999	9	142	151
2000	15	236	251
2001	20	315	335
2002	14	221	235
Total	120	1,890	2,010

This table shows the construction of the data sample for the U.S. SMEs for the period 1994–2002. In the first column, the different years are depicted. In the second column, the number of the defaulted companies found in the COMPUSTAT database is shown. In the third column, the number of non-defaulted companies, given a default rate of 6 per cent, is calculated. In the fourth column, the total number of small and medium sized companies to be selected for each year is shown.

non-missing data).[16] Then, we randomly select non-defaulted firms over the same period in order to obtain an average default rate in our sample as close as possible to the expected average default rate for U.S. SMEs (6 per cent).[17] We use this expected average default rate as a prior probability input in our retrospective analysis.[18] For each selected year, we calculate the number of non-defaulted SMEs in order to maintain the overall average expected default rate. Subsequently, we randomly select, for each year, the number of non-defaulted firms shown in the third column of Table 1. The total of 120 defaults and 1,890 non-defaults are shown at the bottom of that table. In order to provide a picture of small and medium sized enterprises contained in our sample, Figures 1 and 2 show the distribution of their sales and total assets. Note that SMEs might be somewhat arbitrarily classified as either small or medium sized firms using either sales or assets as the size criteria.

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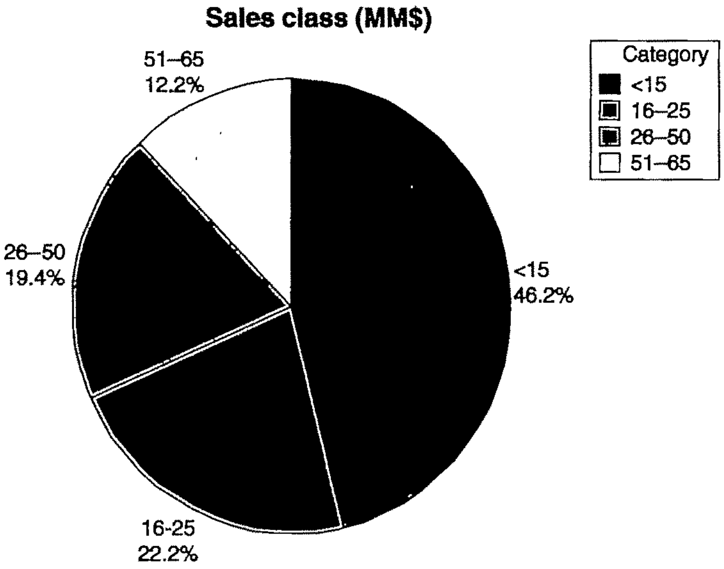
[16] 'TL' footnote is used to indicate firms in bankruptcy, while 'AG' means that the firm is in reorganization.

[17] This expected average default rate for U.S. SMEs has been suggested to us from a Moody's study about small and medium sized firms in the U.S., 'Moody's KMV Riskcalc v3.1 Model' (2004).

[18] See McFadden (1973) and King and Zeng (2001) for a comprehensive analysis of the use of the prior probability in the logit model.

FIGURE 1

DISTRIBUTION OF SALES IN THE U.S. SME SAMPLE



This figure shows the percentage of U.S. SMEs contained in each of four sales classes in our sample. The four size classes could be divided into two groups: ones with sales less than $25 million (small firms) (68.4 per cent), and the ones with sales between $26 and $65 million (medium firms) (31.6 per cent).

Selection of the Variables

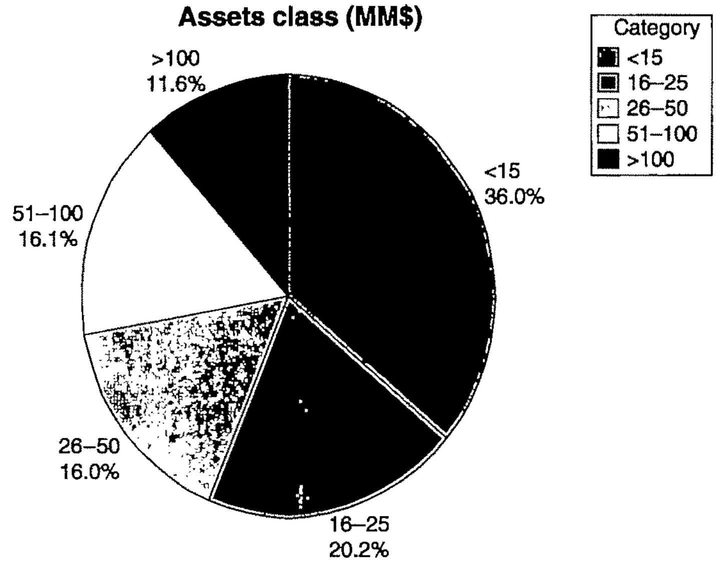
There is a large number of possible candidate ratios identified in the literature as useful to predict firms' default.[19] Furthermore, recent literature (e.g. Lehmann, 2003; Grunet *et al.*, 2004) concludes that quantitative variables are not sufficient to predict SME default and that including qualitative variables (such as the number of employees, the legal form of the business, the region where the main business is carried out, the industry type, etc.) improves the models' prediction power. Notwithstanding this, we are obliged to use only firms' financial statement data since the COMPUSTAT database does not contain qualitative variables.[20]

[19] Chen and Shimerda (1981) show that out of more than 100 financial ratios, almost 50 per cent were found useful in at least one empirical study.

[20] In a recent work, Zhou *et al.* (2005) develop a model for North American privately held firms (not only SMEs) using a maximum expected utility (MEU) model. They gather data from S&P's Credit Risk Tracker database, selecting 20 explanatory variables and separating their sample into four relevant groups of industries. The performance of their model is very promising and slightly higher than a model developed using the same variables and a logistic technique. However, we believe that separating the industry groups played an important role in improving the performance of their model (see von Stein and Ziegler, 1984, and Keasey and Watson, 1987, about the value of integrating qualitative variables into MDA models).

FIGURE 2

DISTRIBUTION OF ASSETS IN THE U.S. SME SAMPLE



This figure shows the percentage of U.S. SMEs contained in each of five asset classes in our sample. The five asset classes could be divided into two groups: ones with assets less than $25 million (small firms) (56.2 per cent), and the ones with assets more than $25 million (medium firms) (43.8 per cent).

Consistent with the large number of studies discussed above, we choose five accounting ratio categories describing the main aspects of a company's financial profile: liquidity, profitability, leverage, coverage and activity. For each of these categories, we create a number of financial ratios identified in the literature as being most successful in predicting firms' bankruptcy (see Table 2, first column).

After the potential candidate predictors have been defined and calculated, we observe the accuracy ratio (as defined by Keenan and Sobehart, 1999) for each and arbitrarily select two variables from each group with the highest accuracy. Since this analysis does not take into account the possible correlations between the variables in each group, only two variables were selected from each ratio category rather than one. Next, we apply a statistical forward stepwise selection procedure of the selected ten variables.[21] We then estimate the full model eliminating

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[21] In some statistical studies, criticism of the forward stepwise selection procedure has been raised as it can yield theoretically implausible models and select irrelevant variables. For this reason, we use a two-step analysis, first choosing the most relevant variables for our study and then applying the stepwise selection procedure. See also Hendry and Doornik (1994).

TABLE 2

VARIABLES SELECTION PROCESS

Variables examined	Variables manually selected	Variables entered in the model	Accounting ratio category
Short term debt/ Equity (book value)	Short term debt/ Equity (book value)		
Equity (book value)/ Total liabilities		Short term debt/ Equity book value	Leverage
Liabilities/Total assets	Liabilities/Total assets		
Cash/Total assets	Cash/Total assets		
Working capital/Total assets			
Cash/Net sales	Working capital/ Total assets	Cash/Total assets	Liquidity
Intangible/Total assets			
EBIT/Sales			
EBITDA/Total assets	EBITDA/Total assets		
Net income/Total assets		EBITDA/Total assets	Profitability
Retained earnings/ Total assets	Retained earnings/ Total assets		
Net income/Sales			
EBITDA/Interest expenses	EBITDA/Interest expenses	Retained earnings/ Total assets	
EBIT/Interest expenses	EBIT/Interest expenses		Coverage
Sales/Total assets	Sales/Total assets		
Account payable/Sales	Account receivable/ Liabilities	EBITDA/Interest expenses	Activity
Account receivable/Liabilities			

This table shows how the variables entered in the final model have been selected. In the first column, candidate financial ratios for U.S. SME default prediction are listed. In the second column, the ten financial ratios (two for each accounting ratio category) that presented the highest accuracy between all of the candidate financial ratios are shown. In the third column, the variables entered in the U.S. SME model are listed and grouped by their accounting ratio category.

the least helpful covariates, one by one, until all the remaining input variables are efficient, that is, their significance level is below the chosen critical level. For this study, the significance level is set at 20 per cent. Of the ten chosen variables (see Table 2, second column), five variables are selected as doing the best overall job together in the prediction of the SME default (see Table 2, third column). Lastly, observing the default event, we construct the dependent variable, Known Probability of Being Good (KPG), as binary (0 = defaulted/1 = non-defaulted).[22]

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[22] We use as dependent variable KPG in order to have positive slopes and intercept since the higher the final logit score, the higher the probability that the firm will not fail.

Actually, we note that the firms considered as defaulted in this study are the ones that went bankrupt under Chapter 11 of the U.S. bankruptcy Code.

Observing the distributions of each of the selected variables for the two dependent variable groups, a large range of values is clearly visible. This high variability of the financial ratios for SMEs can be due either to the different sectors in which these companies operate (real estate firms have financial data completely different from agricultural companies), or to the different ages of the firms in the sample as well as their different level of financial health. We therefore use logarithmic transformations for all of the variables in order to reduce the impact of outlier values for the variables and to decrease both the Type I and Type II errors (i.e., increase the accuracy of the model). To prove the effectiveness of this choice, we provide and compare the analyses and the results obtained utilizing the logged and unlogged predictors.

Logistic Regression

First, we run the logistic regression using the unlogged variables (a detailed discussion of this model is provided in Appendix A). All of the slopes (signs) follow our expectations (i.e., we expect a positive relationship between the KPG and all the predictors except Short term debt/BV of equity) and the Wald test for each of the predictors is statistically significant.[23] Also the Log-likelihood test is statistically significant, that is, we can argue that there is a significantly strong relationship between the selected predictors and the default event.[24] The Hosmer-Lemeshow test (Hosmer and Lemeshow, 1989), which is used to understand whether using an appropriate statistical technique (in this case the logistic regression), is statistically significant ($p = 0.421$) as we were not making an appropriate choice using the logistic regression. However, the result of the Hosmer-Lemeshow test can be misleading since it can be due only to the wide range of values of the original predictors. Lastly, we observe the measures of association (Somers' 'D', Goodman and Kruskal's 'Gamma' and Kendall's 'Tau-b') to compare this model with the one developed utilizing the logarithmic values of the predictors. We depict our first model in Table 3, where the final score (that can be approximated with the probability that a firm does not default) is given by the sum of the constant (4.28) and the product between the slopes and the value of each of the predictors.

As we will demonstrate, the results (e.g., the accuracy ratio is 75 per cent) are accurate, but certainly they could be improved to give us more confidence in the reliability of the model.[25]

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[23] The Wald test, described by Polit (1996) and Agresti (1990), is a way to test whether the parameters associated with a group of explanatory variables are zero, or not.

[24] The Log-likelihood test is used to ascertain whether all the parameters together are useful to estimate the dependent variable. It is comparable to the multivariate *F*-Test in the linear regressions (or MDA) and it is also often used to compare the fit of different models (see Dunning, 1993).

[25] The accuracy ratio can be defined as the ratio of the area between the cumulative accuracy profile (CAP) of the rating model being validated and the CAP of the random model, and the area between the CAP of the perfect rating model and the CAP of the random model. See Engelman *et al.* (2003) for more details.

TABLE 3

MODEL DEVELOPED WITH UNLOGGED PREDICTORS

Log(*PD*/1–*PD*) =	+ 4.28	
	+ 0.18	EBITDA/Total assets
	– 0.01	Short term debt/Equity book value
	+ 0.08	Retained earnings/Total assets
	+ 0.02	Cash/Total assets
	+ 0.19	EBITDA/Interest expenses

This table shows the model developed using the unlogged values of the variables to predict the probability of the firm being bankrupt (PD).

We then utilize the logarithmic transformed predictors in an attempt to increase the accuracy of the model.[26] The EBITDA/total assets (EBITDA/TA) and the retained earnings/total assets (RE/TA) variables, following Altman and Rijken (2004), are transformed as follows: EBITDA/TA → –ln(1–EBITDA/TA), RE/TA → –ln(1–RE/TA). Actually, the distributions of these two variables are negatively skewed and the information content in the fat tails of the distribution is relatively low. So, with this transformation we can give more power to the values that are more significant for the regression. Moreover, in this way we partially correct for the trend of the unlogged variables which were continuously drifting down over the years. For example, the RE/TA variable had a mean absolute value in 1980 of almost 20 percentage points higher than the average value for U.S. companies in 2004. The other three variables have the standard log transformation. After these transformations, the regression results look much more promising (see Appendix B for a detailed discussion of this model's development). Wald and Log-likelihood tests are statistically significant as before and the slopes are all reasonable (see Table 4). This time, the Hosmer-Lemeshow test is not statistically significant ($p = 0.978$). The measures of associations show higher values than before, suggesting that the revised model should have higher prediction accuracy. The accuracy ratio jumped from 75 per cent to 87 per cent when we transformed each of the original firm variables by using their logarithms. However, to decide if the revised model is really better than the one built with the original predictors, we test and compare their prediction accuracy on a hold-out sample.

Validation Results

A hold-out sample of twenty-six bankrupt SMEs for the two-year period 2003–04 is assembled to test the validation performance of our models.[27] Then, we randomly

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[26] Bradbury (1988) proves that accounting adjustments made prior to model development do not improve the ability to classify loan default *ex post*. However, this kind of log transformation results in a significantly higher model accuracy.

[27] Again, we use the WRDS COMPUSTAT tapes.

TABLE 4

MODEL DEVELOPED WITH LOGGED PREDICTORS

Log(*PD*/1–*PD*) =	+	53.48	
	+	4.09	–Log(1–EBITDA/Total assets)
	–	1.13	Log(Short term debt/Equity book value)
	+	4.32	–Log(1–Retained earnings/Total assets)
	+	1.84	Log(Cash/Total assets)
	+	1.97	Log(EBITDA/Interest expenses)

This table shows the model developed using the logged values of the variables to predict the probability of the firm being bankrupt.

TABLE 5

HOLD-OUT SAMPLE FOR SMES

	Number	Percentage
Non-defaulted firms	406	94.0
Defaulted firms	26	6.0
Total	432	100

This table shows the structure of the U.S. SME hold-out test sample. In the first and second row, the number and the percentage of non-defaulted and defaulted firms are shown.

select non-bankrupt companies over the same recent two-year period using the methodology explained before. The test sample contains a total of 432 firms (bankrupt and non-bankrupt) with sales less than $65 million (see Table 5).

Table 6 summarizes the results, in terms of predictive accuracy of the three different models (the two logistic models developed with logged and unlogged predictors and a generic corporate model) tested on the hold-out sample. As generic corporate model, we use the Z''-Score model developed by Altman (2005), Altman and Hotchkiss (2005), Altman *et al.* (1995) (see footnote 4 for details). The error rates shown in Table 6 are calculated fixing an arbitrary cut-off rate of 30 per cent of the population and are quite close to the error rates obtained from the development sample (in the same Table 6, but in brackets).[28]

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[28] Applying the developed model to all the companies contained in the test sample, a score is calculated for each firm. Then, the 30 per cent of the sample with the lowest scores is considered rejected in order to check the accuracy of the model to classify the firms correctly and incorrectly (as defaulted and non-defaulted) between accepted and rejected clients. The choice to fix a cut-off at 30 per cent is not based on any specific reason; any other percentage could have been chosen for the analysis.

Hence, we can argue that the models are statistically robust and valid. We acknowledge that the chosen cut-off rate is possibly not the optimal one since the different misclassification costs for the Type I and Type II error rates are not taken into account (see Altman *et al.*, 1977; Taffler, 1982). However, the purpose of this work is to use a common, arbitrary, fixed cut-off rate only to compare the prediction accuracy of the different models and not to find the best cut-off strategy. Moreover, arguably the optimum cut-off value cannot be found without a careful consideration of each particular bank peculiarity (e.g., tolerance for risk, profit-loss objectives, recovery process costs and efficiency, possible marketing strategies).

Comparison of Results

In order to compare our results we provide two indexes (columns 4 and 5 in Table 6). The first measures the accuracy of each model in correctly classifying defaulted and non-defaulted firms, as the complement of the weighted average of the Type I and Type II error rates. The second is called the accuracy ratio (AR) and is defined as the ratio of the area between the cumulative accuracy profile (CAP) of the rating model being validated and the CAP of the random model, and the area between the CAP of the perfect rating model and the CAP of the random model (see Engelman *et al.*, 2003, for further details). Indeed, it measures the ability of the model to maximize the distance between the defaulted and non-defaulted clients.

TABLE 6

MISCLASSIFICATION RATES AND ACCURACY RATIOS OF THE DIFFERENT MODELS

	Type I error rate	Type II error rate	1– Average error rate	Accuracy ratio
Logistic model developed with logarithm transformed predictors	11.76% (9.23%)	27.92% (24.64%)	80.16% (83.07%)	87.22% (89.81%)
Logistic model developed with original predictors	21.63% (20.11%)	29.56% (27.86%)	74.41% (76.02%)	75.43% (77.68%)
Z″-Score Model	25.81% (26.12%)	29.77% (29.52%)	72.21% (72.18%)	68.79% (68.57%)

This table shows the misclassification rates and the accuracy ratios of the three different models applied to the test sample fixing an arbitrary cut-off rate of 30 per cent. The second column shows the Type I error rate, that is, the percentage of defaulted firms classified as non-defaulted. In the third column, the Type II error rate is illustrated. This rate represents the percentage of non-defaulted firms classified as defaulted. The third column shows the average accuracy of the model, calculated as 1 minus the average of the two error rates. In the last column, the accuracy ratio, defined as the ratio of the area between the cumulative accuracy profile (CAP) of the rating model being validated and the CAP of the random model, and the area between the CAP of the perfect rating model and the CAP of the random model, is shown. The values in the brackets result from the application of the different models on the development sample.

TABLE 7

MDA MODEL DEVELOPED WITH LOGGED PREDICTORS

$z =$	+	15.06	
	+	2.44	– Log(1–EBITDA/Total assets)
	+	0.91	Log(Short term debt/Equity book value)
	+	3.90	–Log(1–Retained earnings/Total assets)
	+	4.15	Log(Cash/Total assets)
	+	3.49	Log(EBITDA/Interest expenses)

This table shows the model developed using multivariate discriminant analysis to predict the discriminant score (z).

The overall accuracy level (AR) of our two new logistic models is 75 per cent, based on the unlogged variables, and 87 per cent based on the logged variables. Most importantly, the Type I error is reduced dramatically when we use the logged variables model from over 21 per cent to 11.76 per cent. Also in Table 6, we compare the hold-out results with the popular Z''-Score results built by Altman (1993) to include all industrial firms.[29] Applying the four variable Z''-Score model to the same hold-out sample, we observe an overall accuracy (AR) of 68 per cent, compared to the 75 per cent for the unlogged new variable model and the 87 per cent for the logged structural approach. Again, the biggest improvement between the new model and the generic Z''-Score approach was in the Type I accuracy.

Multivariate Discriminant Analysis (MDA)

For comparison purposes, we also run a multivariate discriminant analysis (MDA) model using the same development sample as used for the logistic analysis. In this case, we define two groups maintaining the original number of firms in our sample (1,890 non-defaulted firms and 120 defaulted firms). The same five log transformed financial measures as the ones selected for the logistic analysis are utilized as predictors also for MDA. Table 7 shows the model developed with the MDA.

We observe that the ability of this model to separate the two groups is notably lower (see Table 8) than the one developed with the logistic regression (62 per cent accuracy ratio versus almost 78 per cent and 89 per cent measured on the development sample). Moreover, we find that the performance of the MDA model, in terms of maximizing the distance between the two groups (defaulted and non-defaulted firms), is even lower than the performance of the Z''-Score model, developed using MDA, but on data from large corporate firms.

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[29] See footnote 4 for details about the Z''-Score model.

TABLE 8

MISCLASSIFICATION RATES AND ACCURACY RATIOS FOR MDA METHODOLOGY

	Type I error rate	Type II error rate	1– Average error rate	Accuracy ratio
MDA model developed with logarithm transformed predictors	30.12% (29.63%)	29.84% (28.74%)	71.52% (73.32%)	59.87% (62.44%)

This table shows the misclassification rates and the accuracy ratios of the model developed using MDA methodology applied to the test sample fixing an arbitrary cut-off rate of 30 per cent. The second column shows the Type I error rate, that is, the percentage of defaulted firms classified as non-defaulted. In the third column, the Type II error rate is illustrated. This rate represents the percentage of non-defaulted firms classified as defaulted. The third column shows the average accuracy of the model, calculated as 1 minus the average of the two error rates. In the last column, the accuracy ratio, defined as the ratio of the area between the cumulative accuracy profile (CAP) of the rating model being validated and the CAP of the random model, and the area between the CAP of the perfect rating model and the CAP of the random model, is shown. The values in the brackets result from the application of the MDA model on the development sample.

The power of the different financial measures that can be used to predict firms' financial distress is found to be strictly linked to the statistical technique used to develop the prediction model.[30] In this case, the five financial ratios selected for the logistic analysis do a less accurate overall job together than the five ratios selected by Altman (1993) in his Z''-Score model when MDA is chosen as the appropriate statistical technique. Also, in all cases, the ability of MDA models to discriminate between defaulted and non-defaulted firms is lower than logistic models, at least using the same predictors.

BASEL II CAPITAL REQUIREMENTS FOR SMES

This section shows that improving the prediction accuracy of a credit risk model is likely to have beneficial effects on the Basel II capital requirements for SMEs when the Advanced Internal Rating Based (A-IRB) approach is used. Indeed, applying a model with a higher accuracy will result in lower capital requirements regardless of whether the SMEs are all classified as retail customers or as corporates. The new Basel Capital Accord permits banks the possibility to choose whether to classify firms (with sales less than €50 million and exposure less than €1 million) as *corporate* or as *retail*. But the Accord also requires that banks manage SMEs on a pooled basis in order to be allowed to consider them as retail customers and to apply the retail formula to calculate their capital requirement.[31]

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[30] Our results are in contrast with the conclusion of the Nash *et al.* (1989) study. They find that prediction of business failure is insensitive to the selection of accounting variables and modelling technique. We believe that these two factors are extremely important to improve the model prediction power.

The concept of 'pool-management' for SMEs is not clearly explained by the Accord and has been the source of some concern for banks. However, the main motivation for the Basel Committee is, arguably, that many banks, following this requirement, will abandon old forms of relationship management used with SMEs and use more efficient automated decision systems (such as scoring and rating systems). Our previous work (Altman and Sabato, 2005) examines the potential issues that banks can face when setting their internal systems and procedures to manage SMEs on a pooled basis and we calculate the potential capital requirements dependent on what proportion of the bank's SME portfolio is considered as retail or corporate. We conclude that most banks will use a blended approach, classifying a part of the SME portfolio as retail and a part as corporate. As such, we calculate the likely breakeven ratio of retail versus corporate for SME customers.

In Pillar 1 of the new Basel Capital Accord, the rules to calculate bank capital requirements for each of the different segments, or 'buckets', are clearly explained. We focus on the formulas that can be used for SMEs when the A-IRB approach is applied. As already stated, banks can classify SMEs as retail, utilizing the formula for 'other retail exposures', or as corporate, applying the corporate formula with the firm-size adjustment.[32] All formulas follow the same calculation steps involving inputs for correlation (R), capital requirement (K) and risk-weighted assets (RWA).[33] The most important input variables, to be provided by the banks, are three (PDs, LGDs and exposures at default [EAD][34]), while the asset correlation (R) is implicitly given by the Basel formulas.[35]

The exact formulas for SMEs from the final version of the Basel Capital Accord are shown in Table 9. Since in our data samples we do not have the loan exposures or the possibility to estimate the LGD for each counterparty, we have to make some assumptions.

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[31] In the U.S., only large, internationally active banks (core banks) will be required to adopt the A-IRB approach on a mandatory basis, while the other organizations will more than likely remain Basel I banks. This process can create competitive advantages for the biggest banking organizations (see Berger, 2004). As such, U.S. regulators are now considering a new type of regulatory capital known as Basel IA for those banks choosing to not utilize the advanced IRB approach (see Board of Governors of the Federal Reserve, 30 September 2005).

[32] Basel Committee on Banking Supervision, June 2004, para. 330 and paras 272–73.

[33] $RWA = K \times 12.5 \times EAD$. Since the final capital requirement is 8 per cent of this amount, we do not multiply the RWA by 12.5.

[34] As expressed in para. 334 of the Accord, we assume EAD for on-balance sheet items equal to the loan exposure amount.

[35] Asset correlation (R) presents the correlation between the assets in the specific portfolio (retail, corporate, equity, etc.) and in the Accord different formulas are given to calculate this parameter based on the nature of the assets. See for example paras. 272, 273, 283, 328 and 329 of the Accord.

TABLE 9

NEW SME CAPITAL REQUIREMENT FORMULAS

SME as retail	SME as corporate
Correlation = R = 0.03*(1 – EXP(–35*PD))/ (1 – EXP(35)) + 0.16*[1 – (1 – EXP(–35*PD))/ (1 – EXP(–35))]	Correlation = R = 0.12*(1 – EXP(–50*PD))/ (1 – EXP(–50)) + 0.24*(1 – (1 – EXP(–50*PD))/ (1 – EXP(–50))) – 0.04*(1 – (S – 5)/45)
Capital requirement = K = LGD*N((1 – R) ^–0.5)*G(PD) + (R/(1 – R)^0.5)*G(0.999)) – PD*LGD	Capital requirement = K = (LGD*N((1 – R) ^–0.5)*G(PD) + (R/(1 – R)^0.5)*G(0.999))– PD*LGD)*(1 – 1.5*b)^(–1*(1 + (M – 2.5)*b))
	Maturity adjustment = (b) = (0.11852 – 0.05478* LN(PD)^2)

This table shows the new formulas, the ones contained in the last version (June 2004) of the Basel Accord. For the SMEs classified as retail, the formulas are the ones for the 'other retail exposures'. When SMEs are classified as corporate, the formulas to be used are the ones for the corporate, considering the size discount. In the formulas, $N(x)$ denotes the cumulative distribution function for a standard normal random variable (i.e., the probability that a normal random variable with mean zero and variance of one is less than or equal to x). $G(z)$ denotes the inverse cumulative distribution function for a standard normal random variable (i.e., the value of x such that $N(x) = z$).
Source: Basel Committee on Banking Supervision (2004).

This study demonstrates the greater ability of a specific SME credit risk model to separate non-failed from failed firms compared to a generic corporate model (see Tables 10 to 13). We analyse the impact on capital requirements if the entire SME portfolio was considered as *retail* or as *corporate*. We apply two models (Z''-Score and the newly developed, logistic model specific for SMEs) to our sample to compare results. We are able to create seven rating classes with both models. For each rating class, the probability of default (PD) is calculated by dividing the number of defaults by the total number of enterprises in each class. Rating classes have been created in order to obtain the value of PD closest to the one showed by bond equivalent PD distributions. A fixed loss given default (LGD) of 45 per cent is assumed, using the one suggested in the Foundation IRB approach (F-IRB) for senior, unsecured loan exposures, and the percentage of firms in each rating class is used as the weight for the capital requirement (instead of the dollar amount of the loan exposures).[36] Classifying all SMEs as *retail*, we obtain a capital requirement of 4.76 per cent, using the Z''-Score model, and of 4.31 per cent, using the specific model for SMEs (Tables 10 and 13). Both models result in capital requirements considerably below the current 8 per cent level under Basel I.

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[36] We are aware that the assumption that we make about the value of LGD is a strong one. However, we believe that the 45 per cent can be considered as an average value for the entire distribution and does not affect our final results. In our previous work (Altman and Sabato, 2005), we analyse how sensitive are the empirical results to our LGD assumption using a sensitivity analysis and we find that our results are confirmed also utilizing different LGD values.

Table 10

CAPITAL REQUIREMENTS FOR ALL SMES AS RETAIL APPLYING THE Z″-SCORE MODEL

Rating	PD	LGD	R_{sme}	K_{sme}	Weight	Cum. weighted K_{sme}
AAA	0.03%	45%	0.15864	0.0035609	0.0464	0.017%
BBB	0.37%	45%	0.14421	0.0216938	0.0711	0.171%
BB	1.47%	45%	0.10771	0.0424133	0.2730	1.329%
BB–	1.86%	45%	0.09780	0.0455248	0.2979	2.685%
B+	4.73%	45%	0.05483	0.0528520	0.1015	3.221%
B	7.01%	45%	0.04118	0.0554183	0.1000	3.776%
CCC	26.57%	45%	0.03001	0.0889581	0.1100	4.755%

This table shows the capital requirement when all SMEs are classified as retail. In the first column, rating classes have been assigned on the bond equivalent basis. In the second and third column, probability of default (PD) and loss given default (LGD) are shown. In the fourth column, the correlation for each rating class is calculated using the formula: R_{sme} = Correlation = 0.03*(1 – EXP(–35*PD))/(1 – EXP(–35)) + 0.16*[1 – (1 – EXP(–35*PD))/(1 – EXP(–35))]. In the fifth column, the capital requirement linked to each rating class is calculated with the following formula: K_{sme} = Capital requirement = LGD*N((1 – R)^ –0.5)*G(PD) + (R/(1 – R)^0.5)*G(0.999)) – PD*LGD. In the sixth column, the weights are assigned utilizing the percentage of firms in each rating class. In the last column, the product of the capital requirement (K_{sme}) and the weight is cumulated to obtain the total capital requirement.

Table 11

CAPITAL REQUIREMENTS FOR ALL SMES AS RETAIL APPLYING THE NEW MODEL SPECIFIC FOR SMES

Rating	PD	LGD	R_{sme}	K_{sme}	Weight	Cum. weighted K_{sme}
AAA	0.03%	45%	0.15864	0.0035609	0.0618	0.022%
BBB	0.37%	45%	0.14421	0.0216938	0.1727	0.397%
BBB–	0.58%	45%	0.13612	0.0280984	0.1916	0.935%
BB	1.35%	45%	0.11097	0.0412190	0.1993	1.757%
B+	3.92%	45%	0.06295	0.0519062	0.1196	2.378%
B	7.46%	45%	0.03954	0.0560496	0.1083	2.985%
CCC	28.27%	45%	0.03001	0.0905826	0.1467	4.313%

This table shows the capital requirement when all SMEs are classified as retail. In the first column, rating classes have been assigned on the bond equivalent basis. In the second and third column, probability of default (PD) and loss given default (LGD) are shown. In the fourth column, the correlation for each rating class is calculated using the formula: R_{sme} = Correlation = 0.03*(1 – EXP(–35*PD))/(1 – EXP(–35)) + 0.16*[1 – (1 – EXP(–35*PD))/(1 – EXP(–35))]. In the fifth column, the capital requirement linked to each rating class is calculated with the following formula: K_{sme} = Capital requirement = LGD*N((1 – R)^–0.5)*G(PD) + (R/(1 – R)^0.5)*G(0.999)) – PD*LGD. In the sixth column, the weights are assigned utilizing the percentage of firms in each rating class. In the last column, the product of the capital requirement (K_{sme}) and the weight is cumulated to obtain the total capital requirement.

TABLE 12

CAPITAL REQUIREMENTS FOR ALL SMES AS CORPORATE APPLYING THE Z''-SCORE MODEL

	Rating	PD	LGD	$R_{corp.}$	$(b)_{corp.}$	$M_{eff.}$	$K_{corp.}$	Weight	Cum. weighted $K_{corp.}$
Sales €5–25mil	AAA	0.03%	45%	0.20266	0.31683	3.0	0.0103082	0.0464	0.048%
	BBB	0.37%	45%	0.18418	0.18084	3.0	0.0403521	0.0711	0.335%
	BB	1.47%	45%	0.14199	0.12228	3.0	0.0681862	0.2730	2.196%
	BB–	1.86%	45%	0.13179	0.11343	3.0	0.0725625	0.2979	4.358%
	B+	4.73%	45%	0.09572	0.08161	3.0	0.0920618	0.1015	5.292%
	B	7.01%	45%	0.08805	0.06976	3.0	0.1056370	0.1000	6.349%
	CCC	26.57%	45%	0.08444	0.03653	3.0	0.1650145	0.1100	8.165%
Sales €25–50mil	AAA	0.03%	45%	0.22044	0.31683	5.0	0.0173454	0.0464	0.081%
	BBB	0.37%	45%	0.20195	0.18084	5.0	0.0503980	0.0711	0.439%
	BB	1.47%	45%	0.15976	0.12228	5.0	0.0803944	0.2730	2.634%
	BB–	1.86%	45%	0.14957	0.11343	5.0	0.0852268	0.2979	5.173%
	B+	4.73%	45%	0.11350	0.08161	5.0	0.1075484	0.1015	6.264%
	B	7.01%	45%	0.10583	0.06976	5.0	0.1227498	0.1000	7.492%
	CCC	26.57%	45%	0.10222	0.03653	5.0	0.1833518	0.1100	9.510%

This table shows the capital requirement when all SMEs are classified as corporate. In the first column, rating classes have been assigned on the bond equivalent basis. In the second and third column, probability of default (PD) and loss given default (LGD) are shown. In the fourth column, the correlation for each rating class is calculated using the formula: $R_{corp.}$ = Correlation = 0.12*(1 – EXP(–50*PD))/(1 – EXP(–50)) + 0.24*(1 – (1 – EXP(–50*PD))/(1 – EXP(–50)))–0.04*(1 – (S – 5)/45), where S is the amount of sales for each firm. In the fifth column, the maturity adjustment is calculated as: $(b)_{corp.}$ = Maturity adjustment = (0.11852 – 0.05478*LN(PD)^2). In the sixth column there is the effective maturity (M_{eff}). In the seventh column, the capital requirement linked to each rating class is calculated with the following formula: $K_{corp.}$ = Capital requirement = (LGD*N((1 – R)^–0.5)*G(PD) + (R/(1 – R)^0.5)*G(0.999)) – PD*LGD)*(1 – 1.5*b)^(–1*(1 + (M – 2.5)*b)). In the eighth column the weights are assigned utilizing the percentage of firms in each rating class. In the last column the product of the capital requirement (K_{sme}) and the weight is cumulated to obtain the total capital requirement.

To consider SMEs as *corporate* (Tables 12 and 13), we have to make two additional assumptions. The first is the effective maturity ($M_{eff.}$). We select possible maturities of three years for smaller firms and five years for medium sized firms. The maturity adjustment ($(b)_{corp.}$) is a function only of PD. The second assumption is about the amount of sales to use for the size adjustment. We split the SME population into two groups: one with sales between €5 and €25 million (small) and the other with sales between €26 and €50 million (medium). In this way we use an average amount of sales of €10 and €30 million in each size group, respectively.[37] The two groups' percentages of capital requirements are aggregated, considering

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[37] These average amounts are based on the realistic assumption that each sales distribution is skewed with more relatively small borrowers than relatively large borrowers (see also Altman and Sabato, 2005).

Table 13

CAPITAL REQUIREMENTS FOR ALL SMES AS CORPORATE APPLYING THE NEW MODEL SPECIFIC FOR SMES

	Rating	PD	LGD	$R_{corp.}$	$(b)_{corp.}$	$M_{eff.}$	$K_{corp.}$	Weight	Cum. weighted $K_{corp.}$
Sales €5– 25mil	AAA	0.03%	45%	0.20266	0.31683	3.0	0.0103082	0.0618	0.064%
	BBB	0.37%	45%	0.18418	0.18084	3.0	0.0403521	0.1727	0.761%
	BBB–	0.58%	45%	0.17424	0.16051	3.0	0.0493287	0.1916	1.706%
	BB	1.35%	45%	0.14546	0.12549	3.0	0.0665925	0.1993	3.033%
	B+	3.92%	45%	0.10133	0.08758	3.0	0.0871829	0.1196	4.076%
	B	7.46%	45%	0.08732	0.06796	3.0	0.1082527	0.1083	5.249%
	CCC	28.27%	45%	0.08444	0.03524	3.0	0.1662226	0.1467	7.686%
Sales €25–50mil	AAA	0.03%	45%	0.22044	0.31683	5.0	0.0173454	0.0618	0.107%
	BBB	0.37%	45%	0.20195	0.18084	5.0	0.0503980	0.1727	0.977%
	BBB–	0.58%	45%	0.19201	0.16051	5.0	0.0600597	0.1916	2.128%
	BB	1.35%	45%	0.16324	0.12549	5.0	0.0786535	0.1993	3.696%
	B+	3.92%	45%	0.11911	0.08758	5.0	0.1019516	0.1196	4.916%
	B	7.46%	45%	0.10510	0.06796	5.0	0.1256196	0.1083	6.276%
	CCC	28.27%	45%	0.10222	0.03524	5.0	0.1842301	0.1467	8.978%

This table shows the capital requirement when all SMEs are classified as corporate. In the first column, rating classes have been assigned on the bond equivalent basis. In the second and third column, probability of default (PD) and loss given default (LGD) are shown. In the fourth column, the correlation for each rating class is calculated using the formula: $R_{corp.}$ = Correlation = 0.12*(1 – EXP(–50*PD))/(1 – EXP(–50)) + 0.24*(1 – (1 – EXP(–50*PD))/(1 – EXP(–50))) – 0.04*(1 – (S – 5)/45), where S is the amount of sales for each firm. In the fifth column, the maturity adjustment is calculated as: $(b)_{corp.}$ = Maturity adjustment = (0.11852 – 0.05478*LN(PD)^2). In the sixth column there is the effective maturity (M_{eff}). In the seventh column, the capital requirement linked to each rating class is calculated with the following formula: $K_{corp.}$ = Capital requirement = (LGD*N((1 – R)^–0.5)*G(PD) + (R/(1 – R)^0.5)*G(0.999)) – PD*LGD)*(1 – 1.5*b)^(–1*(1 + (M – 2.5)*b)). In the eighth column the weights are assigned utilizing the percentage of firms in each rating class. In the last column the product of the capital requirement (K_{sme}) and the weight is cumulated to obtain the total capital requirement.

their distribution of sales for the two classes (68 per cent for small and 32 per cent for medium sized firms). The resulting weighted capital requirements of the two size components of SMEs, calculated in Tables 12 and 13, are 8.60 per cent (0.68*8.17 + 0.32*9.51), applying the Z''-Score model, and 8.10 per cent (0.68*7.69 + 0.32*8.98), applying the new specific model for the SMEs.

The results of this study show that if banks classify their entire SME portfolio as corporate using the A-IRB approach, they will likely face higher capital requirements than under the current Basel I. And we demonstrate that banks will find this result even if they will apply a specific SME credit risk model with very high prediction accuracy (87 per cent in this case). The capital requirement will still show a value (8.10 per cent) slightly higher than the current 8 per cent. Of course, it is possible that an even more accurate SME model could be developed resulting in a capital requirement slightly lower than the current 8 per cent. In any case, capital requirements are considerably lower the greater the percentage of a bank's SME portfolio that can be classified as retail customers, but it may not be possible for some banks to classify a large proportion as retail. Also, in all cases, the better the credit scoring model, the lower the capital requirements.

CONCLUSIONS

We have investigated whether banks should separate small and medium sized firms from large corporates when they are setting their credit risk systems and strategies. The findings demonstrate that managing credit risk for SMEs requires models and procedures specifically focused on the SME segment.

We improve upon the existing literature in various ways. For the first time, the definition of SME is provided by the new Basel Capital Accord (sales less than $65 million) that will become relevant for banks in about one year, when Basel II will be in force. Gathering data on U.S. SMEs, we analyse a complete set of financial ratios, exploring carefully their characteristics. Second, by utilizing well-known statistical techniques, five financial ratios are found in combination to be the best predictors of SME default and we use them to develop a credit risk model specific for SMEs. This model is used as an instrument to show, on a hold-out sample, the different performance of a specific SME model versus a generic corporate model (Z''-Score model). Results strongly confirm our expectations. The performance, in terms of prediction accuracy, of our specific SME model is almost 30 per cent higher than the performance of the generic corporate model. Indeed, we demonstrate that banks will likely enjoy significant benefits in terms of SME business profitability by modelling credit risk for SMEs separately from large corporates. Also MDA default prediction models are demonstrated as likely to have a lower ability to discriminate between defaulted and non-defaulted clients than logistic models when the same variables are used as predictors.

Last, we show that modelling credit risk specifically for SMEs also results in slightly lower capital requirements (around 0.5 per cent) for banks under the A-IRB approach of Basel II than if one were applying a generic corporate model. This is true whatever the percentage of SME firms classified as retail or as corporates. This is due to the higher discrimination power of a specific SME credit risk model applied on an SME sample.

The findings also confirm, to some extent, what has been found in the other studies: that is, that small and medium sized enterprises are significantly different from large corporates from a credit risk point of view. However, we demonstrate that banks should not only apply different procedures (in the application and behavioural process) to manage SMEs compared to large corporate firms, but these organizations should also use instruments, such as scoring and rating systems, specifically addressed to the SME portfolio. Thus, banks should carefully consider the results of this study when setting their internal systems and procedures to manage credit risk for SMEs.

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APPENDIX A

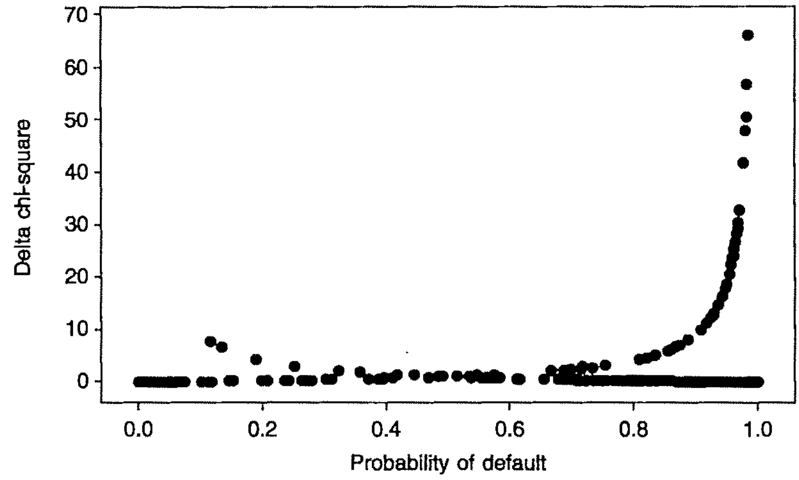
LOGISTIC REGRESSION WITH ORIGINAL PREDICTORS

First, we run a logistic regression using the original value of the predictors. The following variables were entered in the regression: EBITDA/Total assets, Short term debt/Equity book value, Retained earnings/Total assets, Cash/Total assets and EBITDA/Interest expenses.

As a diagnostic plot, we observe the delta chi-square versus probability of default. This graph shows an approximation of the square of residuals versus

Figure A1

DIAGNOSTIC PLOT OF DELTA CHI-SQUARE VERSUS PROBABILITY OF DEFAULT



This figure shows an approximation of the square residuals versus fitted values. When fitting the right model, this graph should resemble an 'X'.

fitted values. The closer the resemblance to an 'X', the more confident we can be that we are fitting the right model.

Observing this plot and taking into account the result of the Hosmer-Lemeshow test, we can be reasonably sure that this is not the optimal model. The high variability of the financial ratios is likely to play a strong role in this result; hence we need to reduce this large range of possible values, for example by using a logarithmic transformation of the predictors.

APPENDIX B

LOGISTIC REGRESSION WITH LOGARITHMIC TRANSFORMED PREDICTORS

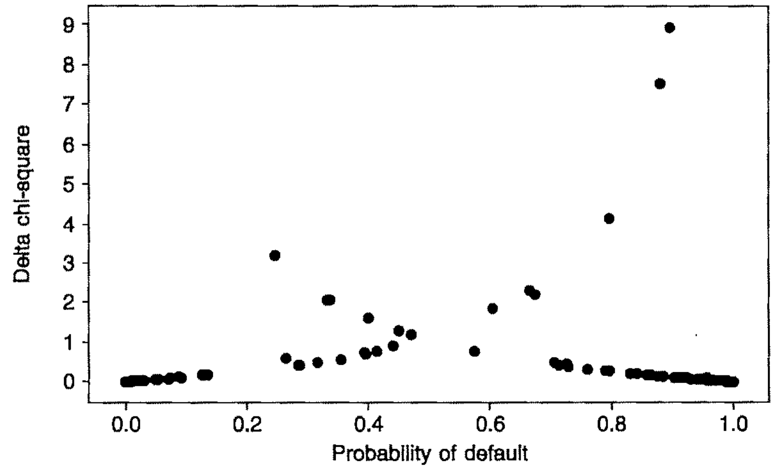
We run a logistic regression using the logarithmic transformed value of the predictors. The following variables entered in the regression: EBITDA/Total assets, Short term debt/Equity book value, Retained earnings/Total assets (RE/TA), Cash/Total assets and EBITDA/Interest expenses. In order to increase the effectiveness of the EBITDA/Total assets (EBITDA/TA) and the RE/TA variables, these variables are log-transformed as follows: EBITDA/TA → –ln(1 – EBITDA/TA), RE/TA → –ln(1 – RE/TA).

We observe the delta chi-square versus probability of default, as diagnostic plot.

This plot confirms the result of the Hosmer-Lemeshow test. Observing the measures of association, we can also argue that the performance of this model will be higher (as we indeed find).

FIGURE B1

DIAGNOSTIC PLOT OF DELTA CHI-SQUARE VERSUS PROBABILITY OF DEFAULT



This figure shows an approximation of the square residuals versus fitted values. When fitting the right model, this graph should resemble an 'X'.

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Discussion of Altman and Sabato

Altman and Sabato (2007; hereafter AS) examine a large set of SME data, on the presumption that existing default models might not explain SME defaults with the same statistical effectiveness or efficiency as models estimated using data drawn strictly from the SME sector. A pragmatic but limiting aspect of the study is that no SME-centric variables or functional forms are introduced. It is possible, for example, that management attributes are highly variable in the SME sector and critical to SME survival. To argue that we need a more SME-specific model for SMEs would suggest that we may benefit from new variables or model structures, rather than only new data.

The logistic regression models estimated by AS are based on intuitive, and at some levels arbitrary, choice of variables. Since there is no general theory of business default (see Peat, 2007), this is understandable and characteristic of statistical default prediction models broadly. Model selection is an empirical 'try it and see' exercise, resting on how well the models compared appear to fit the data, rather than on general theoretical grounds. In these circumstances, it is crucially important that rival models are evaluated on sound methodological criteria. The focus of my comment is on the model selection criteria employed by AS, and their potential pitfalls.

AS contains several methodological misconceptions. The first occurs in the authors' suggestion that the Default-Not Default classification threshold can be selected arbitrarily when the purpose is merely to choose between two different models or compare their relative goodness of fit: 'the purpose of this work is to use a common, arbitrary, fixed cut-off rate only to compare the prediction accuracy of the different models and not to find the best cut-off strategy'.

To exemplify what is meant here, the authors impose a cut-off of 30 per cent, meaning that for each model the 30 per cent of firms with highest estimated probabilities of default *PD* are classified as 'Default', and the remaining 70 per cent as 'Not Default'. The procedure is then to count up the number of misclassifications made by each model and choose the model for which this misclassification rate is lowest.

The problem with such a procedure is that by changing the discretionary cut-off percentage from 30 per cent to some other arbitrary level, each model produces a different, and possibly disproportionate, number of misclassifications, meaning that the 'most accurate' model (that with the lowest number of misclassifications) is subject to change depending on the chosen percentage.

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TABLE 1

FIRM *PD* RANKED BY MODELS Φ AND Ω

Model Φ		Model Ω	
Firm	*PD*	Firm	*PD*
C	high	A	high
A		C	
B	⇓	D	⇓
D	Low	B	low
E		E	

TABLE 2

NUMBER OF MISCLASSIFICATIONS AT EACH POSSIBLE CUT-OFF

Cut-off	Model Φ			Model Ω		
	Type I	Type II	Misclassifications	Type I	Type II	Misclassifications
20%	A, B	C	3	B		1
40%	B	C	2	B	C	2
60%		C	1	B	C, D	3
80%		C, D	2		C, D	2

A simple example is as follows. Imagine that there are five firms in the sample {Firm A, Firm B, . . . , Firm E}, of which Firm A and Firm B have actually defaulted. Two models {Model Φ, Model Ω} are estimated against a single data set, producing probabilities of default represented in Table 1. Note that all firms are listed in order of the estimated probability of default *PD* as produced under each model.

Suppose that the arbitrary cut-off is 20 per cent (row 1), 40 per cent (row 2), 60 per cent (row 3), 80 per cent (row 4). The numbers of misclassifications are then as shown in the Table 2. For example, if the cut-off is 60 per cent, then Model Φ makes just one misclassification (a Type II error) and Model Ω makes three misclassifications (one Type I error and two Type II errors), so Model Φ is preferred (assuming that Type I and Type II errors are given the same weight). Alternatively, if 20 per cent is the arbitrary cut-off, then Model Φ makes three misclassifications and Model Ω makes only one misclassification, so Model Ω is preferred. This is indicative of how the AS model selection method produces arbitrary conclusions, and can be manipulated.

To avoid the potential for such mistakes, some researchers have applied the method of ROC (receiver-operating characteristic) curves. This method produces for each model a measure called the 'area under the ROC curve', representing an 'average' of the number of misclassifications made by the model over all possible probability thresholds (Hosmer and Lemeshow, 2000, pp. 160–4). In the ideal case, one model totally dominates the other, in that its ROC curve is uniformly higher than the other's. This means that it makes both fewer Type I errors and fewer Type II errors at every possible cut-off. AS implicitly introduce a ROC criterion when they refer to the 'accuracy ratio' of each model.

While the ROC methodology improves on the arbitrary single threshold method, it may still result in a sub-optimal model selection from a Bayesian decision theoretic perspective, even in the ideal case where one model dominates the other over all possible probability (classification) thresholds. The argument is based on the fundamental Bayesian criticism of conventional hypothesis tests, namely that they lead to decisions based on conditional 'tail area' probabilities rather than conditional probabilities of the sample statistic (here, the estimated *PD* of the firm) actually observed (Berger, 1985; Berger and Wolpert, 1988). A short explanation is as follows.

Consider two possible cut-off or threshold probabilities, π_1 and π_2, where $\pi_1 > \pi_2$. Let the operating characteristics of the two models with respect to these probabilities be such that:

$$p_\Omega(PD > \pi_1 \mid D) > p_\Phi(PD > \pi_1 \mid D) \tag{1}$$

$$p_\Omega(PD > \pi_2 \mid D) > p_\Phi(PD > \pi_2 \mid D) \tag{2}$$

and

$$p_\Omega(PD > \pi_1 \mid ND) < p_\Phi(PD > \pi_1 \mid ND) \tag{3}$$

$$p_\Omega(PD > \pi_2 \mid ND) < p_\Phi(PD > \pi_2 \mid ND) \tag{4}$$

where $D \equiv$ default, $ND \equiv$ not default, and $p_\Omega(\,)$ and $p_\Phi(\,)$ denote error characteristics of Models Ω and Φ respectively. Inequalities (1) and (2) imply that Model Ω is 'more powerful' than Model Φ (i.e., makes fewer Type II errors than Model Φ) at a threshold probability of either π_1 or π_2. Similarly, inequalities (3) and (4) imply that Model Ω makes fewer Type I errors than Model Φ at a threshold probability of either π_1 or π_2. It follows, therefore, that (locally at least) Model Ω stochastically 'dominates' Model Φ in terms of conditional 'tail-areas' (its ROC curve is uniformly higher).

Now, suppose that in addition to, and consistent with, inequalities (1)–(4), we know that

$$\frac{p_\Phi(\pi_2 < PD < \pi_1 \mid D)}{p_\Phi(\pi_2 < PD < \pi_1 \mid ND)} >> \frac{p_\Omega(\pi_2 < PD < \pi_1 \mid D)}{p_\Omega(\pi_2 < PD < \pi_1 \mid ND)},$$

meaning that the likelihood ratio given a sample observation *PD* (for any given firm) within the interval $\pi_2 < PD < \pi_1$ is far more pronounced under Model Φ than under Model Ω. From a Bayesian perspective, an observed *PD* in this interval is very informative under Model Φ but much less informative under Model Ω. It follows that if sample observations or *PD*s falling within the interval $\pi_2 < PD < \pi_1$, or another interval with the same comparative error properties, occur with high relative frequency, then Model Φ is inherently more discriminating than Model Ω (notwithstanding being locally dominated in terms of ROC). The Bayesian consequence of using Model Ω, rather than Model Φ, is then a much weaker revision of priors, meaning generally less accurate posterior probabilities and greater expected losses from decision making.

The issue of whether a model results in accurate default probabilities (Bayesian or otherwise) leads to the more general topic of evaluating predictions made in the form of probabilities (e.g., $p(\text{Default}) = PD = 0.31$) rather than in conventional categorical form (e.g., 'Default'). This is the subject of an extensive and highly developed literature in statistics and applied forecasting disciplines, particularly in meteorology, where 'experts' and prediction models have long been used to produce point probability estimates. There is great potential for application of this literature, particularly the theory of probability scoring rules, to the evaluation of logistic regression and other probability forecasting models used in default prediction. The literature is summarized by Winkler (1996). Extensive references are provided in Johnstone (2007a, 2007b, 2007c).

There is one further misconception in AS that should be corrected. The authors argue (p. 347) that a better model gives rise to lower Basel II capital provisions, and hence reduced costs to the lending agencies and their clients: 'applying a model with a higher accuracy will result in lower capital requirements'.

This is not necessarily the case. The capital provisions dictated by a model increase with the number of firms classified as 'Default', denoted below by a 'positive' test result, +. The expected sample rate of positive signals is given by

$$p(+) = p(D)p(+ \mid D) + p(ND)p(+ \mid ND),$$

where $p(D)$ is the true population default rate, $p(ND) = 1 - p(D)$, $p(+ \mid ND)$ is the Type II error rate and $1 - p(+ \mid D)$ is the Type I error rate. It follows that a model that produces less Type II errors (false 'positives') or more Type I errors (false 'negatives') leads to a lower rate of + ('Default') signals, and therefore lower capital provisions. Contrary in part to AS, to make capital provisions lower, the model need only produce a higher rate of Type I errors.

To rationalize the AS intuition regarding the benefits of a more discriminatory model, it is essential to distinguish between capital provisions made *ex ante* (based on the model's probability predictions) and *ex post* losses (based on eventual loan outcomes). A model that makes more Type I errors leads to lower capital provisions, but also higher losses *ex post* (once the defaults occur). In general, a better model (lower Type I and Type II error rates) will lead to better *ex post* outcomes, provided of course that the lending and capital provision decisions made using that model are based on factually correct estimates of the true *ex post* losses from each of the two types of errors.

Again, however, there are subtle Bayesian counter-examples that suggest that the notion of a theoretically 'better' model cannot be represented adequately in terms of Type I and Type II error probabilities ('tail area' probabilities). This is a fundamental point of inconsistency between Bayesian and frequentist statistical logic, and something that seems unrecognized in the distress prediction literature. For a thorough exposition of the Bayesian decision-theoretic perspective, and its clash with orthodox methods of statistical inference, see Bernardo and Smith (1994), Berger (1985), Berger and Wolpert (1988) and Gelman *et al.* (2004).

Note that my corrections of the two main methodological mistakes apparent in AS are written from a conventional standpoint. The Bayesian perspectives are additional and are introduced because they extend our understanding of frequentist statistical methods and their innate logical breakdowns.

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Surviving Chapter 11 Bankruptcies: Duration and Payoff?

Three of the authors previously developed a model to predict the duration of Chapter 11 bankruptcy and the payoff to shareholders (Partington *et al.*, 2001). This work augments that study using a much larger sample to re-estimate the model and assess its stability. It also provides an opportunity for out-of-sample testing of predictive accuracy. The resulting models are based on Cox's proportional hazards model and the current article points to the need to test two important assumptions underlying the model. First, that the hazards are proportional and, second, that censoring is independent of the event studied. Using the extended data set, all the previously significant accounting variables drop out of the model and only two covariates of the original model remain significant. These are the market wide credit spread and the market capitalization of the firm, both measured immediately prior to the firm's entry to Chapter 11. Receiver operating characteristic curves are then used to assess the predictive accuracy of the original and extended models. The results show that Lachenbruch tests can provide a misleading indication of predictive ability out of sample. Using the Lachenbruch method of in-sample testing, both models show predictive power, but in a true out-of-sample test they fail dismally. The lessons of this work are relevant to better predicting the gains and losses likely to accrue to shareholders of companies in Chapter 11 bankruptcy and in similar administrative arrangements in other jurisdictions.

Key words: Bankruptcy; Chapter 11; Duration, Payoffs; Predictive accuracy; Proportional hazards; Survival analysis.

Since the enactment of the United States Bankruptcy Code (1978), Chapter 11 bankruptcy protection has been widely adopted by financially distressed firms seeking rehabilitation. Under Chapter 11 of the Bankruptcy Code, the firm's assets are protected from creditors while the firm files a bankruptcy petition and a reorganization plan with the U.S. Federal Court. The reorganization plan is designed to provide a course of action for the firm under which it may return to a healthy status. When the plan is successfully negotiated by the firm's stakeholders and

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then confirmed by the courts, the firm leaves Chapter 11 bankruptcy.[1] Comparable administrative mechanisms to Chapter 11 exist in other countries. Canada's Creditors Arrangement and Australia's Voluntary Administration are two such instances. Results reported here are therefore relevant for several countries.

Shareholders in Chapter 11 firms face a highly unfavourable payoff space, an occurrence attributable to the fact that '[i]n most instances, the company's plan of reorganization cancel[s] the existing equity shares' (SEC, 2005).[2] Russel *et al.* (1999) found that existing equity holders lost about 70 per cent of their shares' value during Chapter 11 proceedings. This study attempts to forecast if and when positive payoffs will accrue to the shareholders of companies entering Chapter 11.

Partington *et al.* (2001; hereafter PRST), developed a model for predicting whether shareholders would receive any value from their holdings upon a firm's exit from Chapter 11 bankruptcy. The authors employed a statistical method derived from the area of survival analysis known as Cox's (1972) proportional hazards model. Five explanatory variables were identified as significant. Three of these covariates were firm specific, covering aspects of the company's profitability, liquidity and market value, while the other two related to general economic factors. This study uses the same covariates but significantly extends the PRST study.

First, the model is extended by incorporating additional data into the estimation process, thereby increasing the precision of the parameter estimates. The original model was estimated on a relatively small sample of fifty-nine firms from the period 1984–93. In this study, the estimation sample size is more than doubled to 125 firms, and the period from which the estimation sample is drawn increases by three years. Consequently the study covers the period from 1984 to 1996. The stability of the model with respect to time is assessed. The results show that only one firm specific variable and one economic variable retain their significance when the sample size and time period increase. The two variables that remain significant are the credit spread and the market value of equity immediately prior to entry into Chapter 11. The change in significant variables observed as the estimation data were extended suggests potential instability in the model over time.

Second, additional tests are performed to verify two key assumptions underlying the use of Cox's proportional hazards model. Grambsch and Therneau's (1994) test is used to assess the assumption of proportional hazards while Allison's (1984) sensitivity analysis is employed to validate the assumption of independent censoring.[3] Models which do not satisfy these assumptions may be misspecified or contain biased parameter estimates (Allison, 1984; Kalbfleisch and Prentice, 1980). Therefore, the tests performed in this study represent a critical component of any analysis involving Cox's proportional hazards model. This study seeks to enhance awareness of the available tests and highlight the importance of their use within Cox regression analysis. The results show that the estimated models conform to these assumptions, with one exception for the original PRST model, where there is evidence of dependent censoring.

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[1] For a comprehensive review of the Chapter 11 process see White (1989).

[2] In contrast, creditors can seek recourse in Chapter 7 liquidation should the Chapter 11 petition fail.

[3] Censored cases are cases where the outcome is unknown. A critical issue is whether the censoring substitutes for the event. This would be the case, for example, if incomplete information makes it more likely that failing firms are lost from the study before failure is observed.

The models are primarily built for predictive, rather than explanatory, purposes. Tests of predictive power are therefore an important aspect of the research. The third extension to the PRST study, therefore, is in relation to predictive accuracy. In the PRST study predictive ability is assessed using the Lachenbruch method. Predictive accuracy in the current paper is assessed both by using the Lachenbruch method and by using a hold-out sample of ninety-four firms which entered Chapter 11 bankruptcy in the period 1997–99. Following PRST, receiver operating characteristic (ROC) curves are employed for the purpose of assessing forecast accuracy. The models' forecasts performed quite well under the Lachenbruch method, but they performed poorly in relation to the hold-out sample. This latter result is consistent with model instability over time. The result emphasizes the importance of using true out-of-sample and out-of-period data in assessing the accuracy of financial distress prediction models.

LITERATURE REVIEW

Several articles have focused on the factors that influence the outcome of Chapter 11 bankruptcy. Bandopadhyaya (1994), estimating a survival analysis model with a Weibull specification, found that the instantaneous probability of exiting Chapter 11 bankruptcy was significantly related to the interest burden of the firm and capacity utilization of the firm's industry. Casey *et al.* (1986) used a probit model to classify Chapter 11 firms that successfully reorganized against those that liquidated. The authors, following White's (1981) model specification, found that significant variables included measures of profitability and the amount of assets not pledged or secured at the bankruptcy filing date. Their model was able to predict successfully the outcome of 59 per cent of the firms in a hold-out sample. Other factors that have been identified as significant to the outcome of Chapter 11 include the existence of a pre-packaged plan[4] (Betker, 1995), the extent of the firm's use of special financing (Carapeto, 1999) and the cost of the proceedings especially for smaller firms (Tucker and Moore, 1999).

Some studies have attempted to determine the factors which contribute to the time spent in Chapter 11 bankruptcy. Orbe *et al.* (2002) employed a censored partial regression model, whereas Li (1999) adopted a Bayesian approach to address this question. Both studies found that the length of time was related to time spent in pre-Chapter 11 negotiations, the effect of other legal disputes, gross profit margin, size and the existence of a pre-packaged Chapter 11 plan. The similarity of their results is attributable to the fact that both studies employed the same data set.

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[4] A pre-packaged Chapter 11 occurs when the firm simultaneously files the bankruptcy petition and the reorganization plan with the court.

Other researchers have focused on post-bankruptcy filing behaviour of the firm's stock price. Elayan and Meyer (2001) examined stock price reaction to the announcement that a Chapter 11 firm was to access a special type of financing, known as debtor-in-possession (DIP) financing. DIP financing is a post-petition loan available to Chapter 11 firms, which provides the lender priority over existing debt. The authors find that the acquisition of DIP financing is seen as a positive signal by the market about the firm's prospects of rehabilitation. Larger positive equity returns are associated with greater loan size when announced. Russel *et al.* (1999) examined the market valuation of firms in Chapter 11 and found that the firms were not overpriced when valued as an option. They also noted that existing equity holders lost about 70 per cent of their value during the bankruptcy period.

While the studies above examined either the duration, or the outcome, of Chapter 11 bankruptcy, the PRST study jointly examined both duration and outcome. This was done by providing a probability of exiting Chapter 11 with zero value for shareholders and allowing this probability to vary with duration. As noted, a weakness of the PRST study was the relatively small sample size (fifty-nine firms), which, for example, precluded a large hold-out sample in assessing predictive accuracy.

COX'S PROPORTIONAL HAZARDS MODEL

Survival analysis models are concerned with determining the relation between individuals and the time until they experience a particular event. In the current study the event of interest is the exit from Chapter 11 protection with zero value being returned to shareholders.

The survivor function, $S(t)$, specifies the probability that the time until the firm experiences the event, T, is greater than some time t. $S(t)$ and its complement, the probability of experiencing the event (failure), $F(t)$, are defined as:

$$S(t) = P(T > t) = 1 - F(t). \tag{1}$$

In empirical estimation of $S(t)$ it is convenient to work with the hazard rate. The hazard rate $\lambda(t)$, defines the instantaneous rate of failure at time $T = t$ conditional upon the firm surviving until time t.

$$\lambda(t) = \lim_{\Delta \to 0} \frac{P(t \le T < t + \Delta t | T \ge t)}{\Delta t}. \tag{2}$$

The hazard rate can be used to estimate the survival probability since:

$$S(t) = \exp\left[-\int_0^t \lambda(u)du\right]. \tag{3}$$

Cox (1972) suggests estimating the hazard using the proportional hazards model, which is given by:

$$\lambda(t,\underline{z}) = \lambda_0(t)e^{(\underline{\beta z})}, \tag{4}$$

where $\underline{z}$ represents the vector of covariates[5] that influence the hazard, $\underline{\beta}$ represents the vector of their coefficients and $\lambda_0(t)$ represents an underlying (or baseline) hazard rate which measures the effect of time on the hazard rate in the absence of covariates. An attractive feature of this model is that the probability distribution of time to failure is not restricted to a particular functional form.

Cox (1972) shows that estimates of $\underline{\beta}$ in equation (4) can be obtained by maximizing the following log-likelihood function:

$$\log L(\underline{\beta}) = \sum_{i=1}^{k} \underline{\beta}\underline{z}_i - \sum_{i=1}^{k} \log\left[\sum_{j\in R(t)} e^{\underline{\beta}\underline{z}_j}\right], \tag{5}$$

where $R(t)$ is the set of j firms at risk of the event at time t, i indexes the firms that experience the failure event, and k is the number of failures. Given the estimates from equation (5), Kalbfleisch and Prentice (1980) provide a method to recover the estimate of $\lambda_0(t)$ at each failure time.

DATA AND METHOD

Duration is measured from the time a firm files for Chapter 11 until it leaves Chapter 11 with zero value to shareholders. However, if a firm leaves Chapter 11 with some value for shareholders the firm's duration is censored. The risk set, $R(t)$, consists of all firms that have yet to experience the event, or have yet to be censored.

The data used here include the observations used in PRST (the original sample) plus a second data set of new and updated observations obtained from the U.S. Securities and Exchange Commission (the new sample). Both data sets were collected in the following manner. Initially all publicly listed (NYSE, AMEX and NASDAQ) non-financial firms that entered Chapter 11 protection during the respective time periods were considered for the study. However, these samples were subject to certain data requirements which reduced the number of observations significantly. First, the outcome of the Chapter 11 proceedings was required in order to ascertain the value returned to shareholders. Second, the accounting figures and market values used to generate the covariates had to be available from the relevant databases. For the original sample, an additional requirement was imposed. The firms in the sample required sufficient trading history[6] (see Russel *et al.*, 1999, p. 61). The sample selection outcome is presented in Table 1.

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[5] It is conventional to centre the covariates by transforming each observation to its difference from the mean value for that covariate. All covariates used in this paper have been transformed accordingly.

[6] Russel *et al.* (1999) do not make clear what is meant by the requirement of sufficient trading history. However, if insufficient trading history simply denotes an inability to locate pre-filing share price data then this requirement is no more stringent than the filters placed upon the new sample. Share price data are required to calculate a covariate based on market value and therefore firms without pre-filing share data are deleted from all samples.

TABLE 1

SAMPLE DESCRIPTION

Subset	Years	Filter 1	Filter 1 + 2
The original sample	1984–93	138	59
The new sample	1993–99	199	170
The estimation sample	1984–96	219	125
The hold-out sample	1997–99	118	94

This table identifies the number of firms that pass the respective filters. The original sample consists of those firms used in PRST. The *new* sample consists of all data not included in the original sample. The estimation sample includes those firms which were used in estimating the models, whereas the hold-out sample includes those firms used to test the predictive accuracy of the models.
Note: Filter 1—Non-financial firms listed on the NYSE, AMEX and NASDAQ with available share price data and for which the shareholder return outcome was known (original sample has an additional requirement of sufficient trading history); Filter 2—Firms with available accounting and economic data (outliers excluded).

The return outcome to shareholders upon exiting Chapter 11 bankruptcy was determined from the reorganization plan, the Dow Jones News Service, other press releases or direct interview with company representatives. In many cases the reorganization plan called for cancellation of the existing equity. Thus the shares were rendered worthless. In other cases where compensation was provided to shareholders, it was often in the form of options or warrants in the reorganized company and returns in cash were uncommon. If the return outcome could not be ascertained from the available sources then the closing stock price on the plan confirmation date was taken as the return outcome. These stocks were usually traded on the bulletin boards. In cases where the value of the shareholder compensation was less than one cent per share, the return outcome was truncated to zero. Firms for which the outcome could not be found were excluded from the study.

The covariates used in the estimation were measured some time *before* the firm entered Chapter 11 bankruptcy. Accounting data (earnings before interest tax and depreciation, total assets, current assets and current liabilities) from Compustat's Research Insight were taken from the most recent quarterly report of the firm before it entered Chapter 11. If that could not be found, the most recent annual report was consulted, provided that the annual report was no more than one year from the date of entry to Chapter 11. To generate the economic covariates, T-bill, T-bond and corporate bond rates corresponding to the month prior to the firm's Chapter 11 filing were taken from Moody's. Finally, the market capitalization of the firm's equity was calculated by multiplying the number of outstanding shares by the value of the firm's pre-Chapter 11 share price. The share price, from the Centre for Research in Security Prices (CRSP), was recorded on the day immediately before the firm filed for Chapter 11 bankruptcy. If this was unavailable a price up to six months before the filing date was accepted.

TABLE 2

DESCRIPTIVE STATISTICS: TOTAL SAMPLE ($n = 219$)

Covariate	Mean	Median	Maximum	Minimum	Std dev.
Credit spread %	1.589	1.430	2.370	1.200	0.342
Term spread %	1.826	1.450	4.350	0.230	1.047
EBITD/TA	–0.077	–0.022	0.176	–2.00	0.207
CA/CL	0.895	0.739	6.745	0.006	0.798
Log$_e$ *MV*	1.913	1.814	5.488	–2.431	1.311
Days spent in Chapter 11	431	362	1789	4	316

Descriptive statistics for total sample (219 firms) include only those observations with complete accounting, economic and market data. They do not include the observation with the largest *CA/CL* outlier.

TABLE 3

DESCRIPTIVE STATISTICS: ESTIMATION SAMPLE ($n = 125$)

Covariate	Mean	Median	Maximum	Minimum	Std dev.
Credit spread %	1.518	1.420	2.370	1.220	0.292
Term spread %	2.405	2.280	4.350	0.230	1.014
EBITD/TA	–0.043	–0.003	0.176	–0.702	0.123
CA/CL	0.968	0.758	6.745	0.023	0.925
Log$_e$ *MV*	2.184	2.212	5.488	–1.162	1.269
Days spent in Chapter 11	490	434	1789	35	349

Descriptive statistics for estimation sample (125 firms) include only those observations with complete accounting, economic and market data. They do not include the observation with the largest *CA/CL* outlier.

The original PRST model was estimated on fifty-nine firms from 1984–93. An additional three years of data from the *new* sample were added to the original sample for the purpose of testing the stability of the model. Thus the estimation sample consists of 125 firms that entered Chapter 11 bankruptcy during the years 1984–96. The remaining ninety-four firms from 1997 to 1999 represent the hold-out sample used to test the predictive accuracy of the models. Table 2 contains descriptive statistics for the covariates of the firms that make up the total sample, while Table 3 and Table 4 provide the corresponding descriptive statistics for firms in the estimation and hold-out samples. Additionally, descriptive statistics for the number of days that firms spent under Chapter 11 bankruptcy provisions are provided for all three samples in Tables 2 to 4. Further, the percentage of firms who emerged from Chapter 11 bankruptcy with some value for their shareholders

TABLE 4

DESCRIPTIVE STATISTICS: HOLD-OUT SAMPLE ($n = 94$)

Covariate	Mean	Median	Maximum	Minimum	Std dev.
Credit spread %	1.684	1.600	2.170	1.200	0.380
Term spread %	1.059	0.920	1.920	0.460	0.391
EBITD/TA	−0.123	−0.038	0.135	−2.000	0.278
CA/CL	0.782	0.728	2.977	0.006	0.549
$\text{Log}_e MV$	1.577	1.509	4.307	−2.431	1.264
Days spent in Chapter 11	353	310	1201	4	248

Descriptive statistics for hold-out sample (94 firms) include only those observations with complete accounting, economic and market data. They do not include the observation with the largest *CA/CL* outlier.

and were censored, comprised 32 per cent of the total sample, 40 per cent of the estimation sample and 22 per cent of the hold-out sample.

From Table 1, it is apparent that the new sample has a greater proportion of firms relative to the original sample for which accounting and economic data are available. Therefore, survival bias is less prominent in the new sample vis-à-vis the original sample. The addition of new sample observations to the original sample for estimation should produce more precise parameter estimates given the reduction in survival bias (Zmijewski, 1984) and the increase in the number of observations. The total number of firms used in this study (219) is much larger than the samples used in many other studies of Chapter 11 bankruptcy (e.g., Elayan and Meyer, 2001 [167 firms]; Russel *et al.*, 1999 [154 firms]; Bandopadhyaya, 1994 [74 firms]).

The PRST Model

The PRST model, estimated using fifty-nine firms that entered Chapter 11 bankruptcy between 1984 and 1993, is presented in the first column of Table 5.[7]

The PRST model contains two economic, or market-wide, variables—credit spread and term spread—and three firm specific variables—the ratio of earnings before interest, tax and depreciation to total assets, *EBITD/TA*, the natural logarithm of the market value of equity, $\text{Log}_e MV$, and the ratio of current assets to current liabilities *CA/CL*.

Credit spread is defined as the difference between the BAA Corporate Bond Rate (Moody's) and the Treasury Bond rate when the firm files for Chapter 11 bankruptcy. It provides an indication of the level of default risk in the economy. The negative sign of the estimated coefficient on credit spread indicates that the hazard of receiving zero value falls as market wide default risk increases. This counterintuitive result is explained by PRST as an artefact of the negotiation process between creditors and shareholders of Chapter 11 firms. If the credit spread correlates with the number of companies seeking protection under Chapter 11 this may increase both the duration of bankruptcy and the extent of problem loans with which creditors have to deal. As the load of the Chapter 11 cases on the courts increases, it is rational to expect that cases will take longer to process. If so, expected durations in bankruptcy will lengthen, thus reducing the present value of expected returns to creditors. Given the expenses associated with undertaking a Chapter 11 filing (Tucker and Moore, 1999), a speedy resolution would involve fewer costs, increasing the return of all stakeholders. This consideration may lead creditors to be more generous to shareholders in order to reach an earlier settlement. However, it is also possible that the negative sign of the credit spread coefficient is just a sample specific anomaly.

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[7] There is a minor difference in the coefficient and p-value on CA/CL in the results presented here and those presented in PRST. This is due to different methods for handling ties in duration times.

A further explanation for the negative sign for the coefficient on the credit spread might be mean reversion.[8] With the exception of cases that are settled very quickly, the credit spread will change over the time a company spends in Chapter 11. In the presence of mean reversion, companies entering Chapter 11 when the credit spread is high will tend to face an environment of declining credit spreads, and vice versa if they enter Chapter 11 when the credit spread is low. If it is the latter credit spreads which influence the outcome of Chapter 11 and, if there is mean reversion in credit spreads, then the negative coefficient on our measure of the credit spread is to be expected.

Term spread, the other economic variable, encapsulates business cycle effects. It is measured as the difference between the Treasury Bill and Bond rates. The positive sign on the coefficient indicates that the shareholders are more likely to receive value when the economy is at a peak in the business cycle.

EBITD/TA is a scaled measure of the firm's profitability. The negative sign on the coefficient indicates that shareholders are more likely to receive a return from their holdings upon the firm's exit from Chapter 11 bankruptcy when the firm's operating profits are higher. This result is consistent with that of Casey *et al.* (1986), who showed that profitability is a key determinant of whether firms successfully reorganize or liquidate once in Chapter 11 bankruptcy.

Log *MV* is a financial market variable that measures the natural log of the firm's equity market capitalization on the day before it enters Chapter 11. The sign on the coefficient suggests that shareholders are more likely to receive value if the market capitalization of the firm is higher at the beginning of the proceedings. Given market efficiency, this result is not surprising. Firms which offer higher expected cash flows to shareholders, as measured by a larger market capitalization, are more likely to return value to those shareholders upon the firm's exit from Chapter 11 bankruptcy.

CA/CL is a measure of the firm's short term liquidity. The results indicate that more liquid firms have lower hazard rates. This variable is the least significant of all the covariates in the final model. Liquidity has been shown to be an important determinant in other financial distress prediction and Chapter 11 bankruptcy studies (e.g., Chaterjee *et al.*, 1996; Ohlson, 1980).

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[8] We thank Ed Altman for making this suggestion.

MODEL STABILITY AND ESTIMATION

Descriptive Statistics

Descriptive statistics for the estimation sample are provided in Table 3. All three firm-specific covariates contained at least one extreme outlier.[9] The observation containing the Log_e *MV* outlier was excluded from the estimation process since that firm had missing accounting data. In order to maintain consistency with PRST, an extreme *CA/CL* observation of 53.84 was excluded from the estimation sample. All models were estimated with and without the remaining *CA/CL* and *EBITD/TA* outliers. All results were qualitatively similar, with no large changes in significance and coefficient magnitude. Subject to complete data requirements, all outlier observations were included in the estimation sample except for the 53.84 *CA/CL* outlier. The descriptive statistics reported in Table 2 include only those observations that were included in the estimation sample.

As one might expect, the average firm within the sample was already exhibiting signs of financial distress before filing for Chapter 11 bankruptcy protection. The mean EBITD/TA of –0.043 indicates that firms on average were generating negative profits. The mean and median current ratios were both less than one, suggesting firms that were likely to be experiencing short term liquidity problems. Finally, the mean Log_e *MV* value of 2.18 is equivalent to a market capitalization of only $8.8 million, which would have ranked these firms amongst the smallest on the NYSE, NASDAQ and AMEX.

According to the descriptive statistics, covariate characteristics across firms in the estimation and hold-out samples, along with the number of days spent in the Chapter 11 bankruptcy process, appear to differ. From Table 3 and Table 4 it appears that the default risk for firms in the hold-out sample is greater than those in the *estimation* sample. Term spread is smaller over the hold-out period, indicating that the economy may have peaked relative to the period over which the model was estimated. On the average, earnings of firms in the estimation period are greater, which is also consistent with the market value of firms in that period being larger than that of firms in the subsequent hold-out period. There is also a marked difference in the average number of days firms spent in Chapter 11 bankruptcy across the two periods.

Results

The stability of the PRST model was assessed by re-estimating the model parameters, adding data from a new sample consisting of sixty-six firms that entered Chapter 11 bankruptcy between 1993 and 1996. As explained previously, these firms were combined with the original sample (1984–93) to form the estimation sample (1984–96). The original PRST model was estimated and then each additional year's data were successively added and the model re-estimated until there was

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[9] Log *MV*, *CA/CL* and *EBITD/TA* had one, six and six outliers, respectively. An extreme outlier was defined as an observation that was placed more than three times the inter-quartile range away from either the 25th or 75th percentile observations.

Table 5

STABILITY OF THE PRST ESTIMATED HAZARD FUNCTION

	PRST	1984–93	1984–94	1984–95	1984–96
Credit spread	−3.20** (0.00)	−1.70** (0.03)	−1.11* (0.09)	−1.51** (0.01)	−1.58** (0.00)
EBITD/TA	−17.65** (0.00)	−9.21** (0.00)	−3.71** (0.05)	−0.20 (0.87)	0.64 (0.52)
Log$_e$ *MV*	−0.92** (0.00)	−0.51** (0.02)	−0.42** (0.01)	−0.38** (0.00)	−0.32** (0.01)
Term spread	0.44** (0.03)	0.24 (0.24)	0.12 (0.56)	0.06 (0.70)	0.03 (0.80)
CA/CL	−0.75[a] (0.11)	−0.20 (0.54)	−0.28 (0.33)	−0.35 (0.19)	−0.18 (0.34)
Observations	59	66	82	103	125

** significant at 5%, * significant at 10%.

[a] There is a minor difference in the coefficient and *p*-value on CA/CL in the results presented here and those presented in PRST. This is due to different methods for handling ties in duration times.

Coefficient values (*p*-values in brackets) of the PRST covariates as more data are added to the estimation sample. Credit spread is the difference between the BAA Corporate Bond Rate (Moody's) and the Treasury Bond Rate; *EBITD/TA* is the firm's earnings before interest, taxes and depreciation divided by its total assets. *Log$_e$ MV* is the log of the market capitalization of the firm's equity. Term spread is the difference between the Treasury Bond Rate and Treasury Bill Rate. *CA/CL* is the ratio of the firm's current assets to current liabilities. All covariates are measured before the firm files for Chapter 11 bankruptcy.

full coverage of the period 1984–96. Consequently, the sample size is progressively expanded from fifty-nine firms to 125 firms. The resulting coefficient estimates are given in Table 5.

Of interest is the addition of seven more observations from the new sample to the original sample over the same period (1984–93) set renders both term spread and *CA/CL* insignificant. The other variables remain significant but have been reduced in magnitude. The notable shift in variable significance attributable to a slightly altered data set indicates that the results of PRST are quite sensitive to the sample under study.

As more observations are included and the time under study increases, neither *CA/CL* nor term spread re-enter the model as significant variables. This is not entirely surprising given that both variables were the least significant of the PRST model and contributed least to the log likelihood ratio. Thus neither *CA/CL* nor term spread is likely to be a significant predictor of return outcome to shareholders of Chapter 11 firms.

Log$_e$ *MV* has remained significant over the entire estimation period. The negative sign on the coefficient indicates that firms with lower market values upon entry into Chapter 11 bankruptcy were less likely to return value to shareholders. This shows that the market was able to incorporate firms' relative prospects of recovery into share prices and is therefore consistent with the efficient market hypothesis. It is reassuring that Log$_e$ *MV* has remained significant over a larger sample size and period. First, its contribution to the log likelihood ratio was the most significant in the original PRST study. Furthermore, given market efficiency and that textbook theory states that share prices reflect expected cash flows to equity holders, it seems natural that a market based variable would be a good predictor of shareholder returns. Finally, the result is consistent with Shumway's (2001) argument that market variables are strongly related to the occurrence of bankruptcy.

Credit spread is the only other variable that has remained significant over the longer study period. While lower in absolute value than the original PRST value, the coefficient is reasonably stable, fluctuating between –1.11 and –1.70. Interestingly, the variable has retained its negative sign. This suggests that the original negative coefficient for credit spread in PRST is not a sample specific anomaly. Evidently, the larger the credit spread, the lower the risk that shareholders will receive zero value upon the firm's exit from Chapter 11. Returning to the explanation provided by PRST, it is possible that creditors will accept terms favourable to shareholders during periods of high default risk in order to hasten the resolution of proceedings and assure themselves of some compensation for their debt. This is supported by Bandopadhyaya's (1994) findings that a larger amount of interest outstanding increases the probability of exiting Chapter 11 bankruptcy as a continuing entity. Whether the observed sign on credit spread is indeed attributable to the bargaining games of Chapter 11 stakeholders or some other phenomenon cannot be ascertained from the results of this study. However, it is clear that the prevailing credit spread is a significant factor in predicting the return outcome to shareholders of Chapter 11 firms.

The value of the *EBITD/TA* coefficient increases monotonically, becoming less negative each year until firms from 1995 and 1996 are included, when the coefficient becomes insignificantly different from zero. This is a very surprising result since profitability measures have almost always shown to be significant in financial distress prediction models (e.g., Ohlson, 1980; Shumway, 2001). These models used ongoing and financially distressed firms. It could be argued that profitability measures are better able to discriminate between healthy firms and financially distressed firms, rather than (in this case) differentiate between different degrees of financial distress. However, one might expect *EBITD/TA* to retain at least *some* significant explanatory power rather than none, even when used to distinguish the less financially distressed from the more financially distressed. For example, Casey *et al.* (1986) estimated a probit model to identify those factors that can discriminate between firms that successfully reorganize from those that liquidate. The sample for their study consisted of only financially distressed firms. They show that earnings is a significant variable in their model and is able to distinguish different levels of distress.

Taken at face value the results for *EBITD/TA* suggest that profitability is less informative in the post-1993 period. Perhaps the quality of accounting information for distressed firms became poorer due to more aggressive pursuit of earnings increasing accounting policies. Indeed, Schuetze (2001) was one of a number of studies which claimed that 'earnings management' was out of control in the period from the late 1900s to the early 2000s (see also GAO, 2003). However, this is only one possibility; another is that there is a different effect on the hazard depending upon whether the earnings are positive or negative and this is not captured in *EBITD/TA*.

TABLE 6

ESTIMATED MODEL

Covariate	Coefficient	Standard error of coefficient	p-value
Credit spread	−1.628	0.508	0.001
$\text{Log}_e\, MV$	−0.333	0.116	0.004

Pseudo $R^2 = 0.175$, Final log likelihood = −249.2, Log likelihood ratio test (p-value) = 24.1 (<0.0001). Estimated hazard functions for a 2-variable model. Pseudo R^2 measures the overall fit of the hazard function. The log likelihood ratio test tests the null hypothesis that all the covariate coefficients are equal to zero.

Only two variables of the PRST model remain significant over the extended data set: $\text{Log}_e\, MV$ and credit spread. This indicates that the results reported for the PRST model are sample specific. The most surprising result of this stability test is that neither of the two financial ratios remained in the model (*EBITD/TA* and *CA/CL*). $\text{Log}_e\, MV$ is therefore the only remaining firm-specific variable. In summary, increases in both $\text{Log}_e\, MV$ and credit spread reduce the hazard of firms leaving Chapter 11 bankruptcy with no value for shareholders. The other variables of the PRST model are insignificant when estimated using all firms in the estimation sample.

Having established that the original PRST model is unstable over time it is necessary to determine the appropriate model to predict the return outcome for Chapter 11 shareholders. A natural starting point is to produce a model through forward stepwise estimation over the entire estimation sample. This procedure ensures that only the most significant variables are included within the model. The minimum significance level for inclusion is set at 10 per cent. The candidate variables are restricted, however, to the significant covariates of the PRST model, namely credit spread, term spread, *EBITD/TA*, *CA/CL* and $\text{Log}_e\, MV$. The final results of the forward stepwise estimation are produced in Table 6.

The final model contains only two variables (hereafter 'the 2-variable model'), credit spread and $\text{Log}_e\, MV$. Both coefficients are negative, indicating that an increase in either covariate decreases the hazard of leaving Chapter 11 bankruptcy with no value.

TESTS OF ASSUMPTIONS

Two important assumptions underlying the use of Cox's proportional hazards model are the assumption of proportional hazards and the assumption of independent censoring. While rarely tested in the literature, these assumptions are examined here.

Test for Proportional Hazards: Scaled Schoenfeld Residuals

According to the Cox (1972), proportional hazards model, the hazard function for a firm i with covariates z_i is given by:

$$\lambda_i(z_i,t) = \lambda_0(t)e^{\beta z_i}.$$

As firm *j* has an analogous hazard rate, the ratio of the hazards for firm *i* and firm *j* is therefore:

$$\frac{\lambda_i(z_i,t)}{\lambda_j(z_j,t)} = e^{\beta(z_i - z_j)},$$

since the baseline hazard, $\lambda_0(t)$, is constant for all firms at a given failure time. This relationship demonstrates an important proportional hazards assumption underlying the use of Cox's model, that is, that the ratio of the hazards between any two firms is a constant[10] and related only to the difference in the covariates over all *t*. Implicit is that there is no change over time in the effect of a covariate on the risk of a firm leaving Chapter 11 bankruptcy with no value. The consequences of non-proportionality include biased parameter values, incorrect standard errors and biased estimates of the true hazard rate (Kalbfleisch and Prentice, 1980; Box-Steffensmeier and Zorn, 2001). In the broader context of Chapter 11 bankruptcy, the possibility of non-proportional hazards certainly exists.

Of the few to examine this proportionality issue, Grambsch and Therneau (1994) proposed a test based on whether the coefficient of a covariate had a time varying element. It involved testing the restriction that $\gamma_j = 0$ for a covariate *j* in the following equation:

$$\beta_j(t) = \beta_j + \gamma_j g_j(t),$$

where $\beta_j(t)$ is the coefficient of the covariate. In the presence of proportional hazards, $\beta_j(t)$ equals β_j. They showed that scaled Schoenfeld residuals[11] have a mean of $\gamma_j g_j(t)$ at a given failure time, and that the coefficient γ_j can be determined by examining the relationship between the scaled residuals and failure times. These scaled Schoenfeld residuals are plotted against each failure time with a random dispersion about zero indicating that the proportionality assumption holds. This is equivalent to fitting a generalized linear regression equation through the scaled Schoenfeld residuals at each failure time and testing the null hypothesis that its slope is zero. Grambsch and Therneau derived an appropriate test statistic for this procedure which is distributed as a χ^2 with *p* degrees of freedom, where *p* equals number of covariates in the model. The null hypothesis is that $H_0{:}\gamma_j = 0$, and this implies proportional hazards. The results of the proportionality test (Table 7) fail to reject the restriction that $\gamma_j = 0$ across all coefficients and models.

Independent Censoring Test

Censoring arises when companies leave the study without experiencing the failure event. In principle, companies can be censored because they are still at risk of the event when the study concludes, because of missing data so that their final outcome

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[10] However, the hazard of any individual firm is rarely constant over the time on study, due to continual changes in the baseline hazard.

[11] See the Appendix for a detailed definition of scaled Schoenfeld residuals.

TABLE 7

TEST FOR PROPORTIONAL HAZARDS

Covariate	PRST	2-variable model
Credit spread	0.471 (0.449)	0.583 (0.445)
$\text{Log}_e\,MV$	0.046 (0.830)	1.176 (0.278)
EBITD/TA	0.100 (0.752)	n.a.
CA/CL	0.574 (0.449)	n.a.
Term spread	0.833 (0.361)	n.a.

χ^2 statistics and p-values (in brackets) of Grambsch and Therneau (1994) proportional hazards test on the covariates of the PRST and 2-variable model. The null hypothesis is that the covariate exhibits proportional hazards.

is not observed, or because they are removed from the risk of the event by experiencing some other event (i.e., they experience a competing risk). In this study only events where the outcome is known are considered, and therefore, the first two forms of censoring do not apply.[12]

The only form of censoring that arises here is the competing risk of being removed from the risk of no return for shareholders by exiting Chapter 11 with a return for shareholders. We note, however, that this does not preclude future episodes in bankruptcy where there is no return to shareholders. For example, there are the so-called Chapter 22 and Chapter 33 cases, where companies re-enter Chapter 11. Given the nature of censoring here it seems unlikely that censoring would have an impact on the estimated model. Nevertheless, the test of censoring is included in order to demonstrate its application in the bankruptcy literature.

Following the notation of Lagakos (1979), the life process of a given firm is characterized by the random variables T, U and $d.T$, as defined previously, is the time until a firm experiences the event of interest upon its entry into the risk set. U represents the total time on study and d is an indicator variable that denotes whether the firm experienced the event or was censored. When the firm experiences the event ($d = 1$) $U = T$, whereas when the firm is censored ($d = 0$) $U < T$ and $U = C$, where C is the time until censoring. Survival analysis seeks to examine the distribution of T, inferred through observation of the variables (U, d).

Under Cox's proportional hazards model the likelihood function is the product of the probability of observing an event at time T, across all events k. Generally:

$$L = \prod_{i=1}^{k} f(T_i), \tag{8}$$

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[12] The exclusion of firms with incomplete or missing outcomes is a potential weakness of our experimental design since we lose the information that such firms can contribute to duration.

where $f(T_i)$ is some function of the survival time of firm i. However, as stated, T is not directly observable, rather only (U, d). Therefore, the likelihood function available from the data is the joint distribution of k event times and l censor times given by:

$$L = \prod_{i=1}^{k+l} f_1(U_l,d_l) = \prod_{l=1}^{k+l} f_2(T_i,C_l). \tag{9}$$

The distribution function of T is non-identifiable unless certain assumptions are made about the distribution of censor times (Leung *et al.*, 1997). Specifically, it is assumed for survival analysis models that the times in which firms are censored are independent of event times, conditional on the covariate vector $\underset{\sim}{z_i}$ (Allison, 1984). This overcomes the problem of only being able to calculate equation (9), when in fact equation (8) is desired.

Allison (1984) proposes a sensitivity test for independent censoring. The model is re-estimated twice to test the sensitivity of the parameters when the times to failure for censored firms (an unobservable variable) are at their two extremes. The first approach assigns the shortest possible duration to the failure time of censored firms. It assumes that if the censoring had not occurred, the firms would have experienced a failure event at the time they were censored. The second approach assumes the longest possible duration for censored firms. The time on study for censored firms is set to be equal to the longest observed duration (irrespective of whether that corresponds to a failed or censored observation). Results of the independent censoring test are presented in Table 8.

The coefficients retain their overall structure, with the exception of term spread in the PRST model. Unadjusted, the coefficient is significant and positive and remains so when censored observations are assumed to have failed at the time of censoring (short failure). However, when censored observations are adjusted such that they experience long failure times, the coefficient becomes insignificant and changes sign. This indicates that censoring time may not be independent of failure time for firms with similar values of term spread. The sign and significance of the other PRST coefficients are insensitive to the treatment of censored observations. The 2-variable model exhibits independent censoring as the coefficient values retain their significance regardless of the treatment of censored observations.

The results highlight the importance of testing for independent censoring. The coefficient value on term spread in the PRST model is sensitive to the censoring times of firms, a fact not identified by PRST. That the PRST model is slightly misspecified affects the reliability of inferences based on the model parameters and, potentially, the results of predictive accuracy tests.

PREDICTIVE ACCURACY TESTS

Having established the functional form of the hazard rate, it is possible to generate survival functions for each firm (see equation (1)). Survival functions were produced for the two models, both within and outside of the estimation period.

TABLE 8

TEST FOR INDEPENDENCE OF CENSORING

	PRST model			2-variable model		
	Unadjusted failure	Short failure	Long failure	Unadjusted failure	Short failure	Long failure
Credit spread	−3.20** (0.00)	−1.13** (0.04)	−2.13** (0.02)	−1.63** (0.00)	−0.62** (0.04)	−1.62** (0.00)
Log$_e$ *MV*	−0.92** (0.00)	−0.28** (0.03)	−0.61** (0.00)	−0.33** (0.00)	−0.22** (0.01)	−0.21** (0.04)
EBITD/TA	−17.65** (0.00)	−5.21** (0.02)	−18.04** (0.00)	n.a.	n.a.	n.a.
CA/CL	−0.75 (0.11)	−0.23 (0.19)	−0.30 (0.42)	n.a.	n.a.	n.a.
Term spread	0.44** (0.03)	0.50** (0.00)	−0.17 (0.33)	n.a.	n.a.	n.a.

** significant at 5% level, * significant at the 10% level.
Results of the Allison (1984) sensitivity test for independence of censoring performed on the PRST and 2-variable models. The coefficient values, with p-values in brackets, are presented for each covariate with differing treatment of censored observations. Unadjusted failure coefficients are estimated with observed censor times. Short failure coefficients are estimated with censored observations adjusted such that they experience the event at the time of censoring. Long failure coefficients are estimated with censor times equal to the longest time observed in the sample. Covariates are as defined previously.

The hold-out sample was suitable to generate out-of-period survival profiles. Because another sample was not available within the estimation period, the Lachenbruch method was utilized to create a within-period hold-out sample and the corresponding survival profiles. This involved holding-out one firm and re-estimating the model using the remaining firms of the relevant sample.[13] The resultant covariate coefficients were used to develop the survival profile of the firm from the hold-out sample. This process was repeated until the survival functions of all firms were generated. The probability outputs of the survival functions represent a means of quantifying the failure risk of firms. Converting the probability values of the survival curve into a state prediction (survivor or failure) is achieved by setting a cut-off probability. However, the determination of an optimal cut-off probability is not a trivial task.

A method which overcomes the problems associated with determining an appropriate cut-off probability is the receiver-operating characteristic (ROC) curve, an analysis tool derived from signal detection theory. Signal detection theory describes the mechanism by which individuals or systems discern the occurrence of some event on the basis of imperfect information (Mason, 2003). A firm's survival probability is a point on a scalar continuum, $S(t)$, between 0 and 1, and represents the signal used to discern the event of interest.

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[13] The relevant sample is the sample upon which the model was estimated. For the 2-variable model the appropriate sample was the estimation sample. For the PRST model, the relevant sample was the original sample.

Based on a cut-off probability of s, for a given failure time, t, a firm is forecast to leave Chapter 11 bankruptcy with no value when $S(t) \leq s$, and not so otherwise. If $f_1(S,t)$ is the probability density function for failures and $f_0(S,t)$ is the probability density function for survivors, then the forecasting process is given by Figure 1. The probability density function of failures, $f_1(S,t)$, contains a signal about the occurrence of the event. The location $f_1(S,t)$ lies somewhere to the left of $f_0(S,t)$, since lower values of $S(t)$ signal that the firm is more likely to experience the event.

The hit rate, H, denotes the proportion of firms which are accurately forecast to have experienced the event. It represents that part of the failure's probability density function, $f_1(S,t)$, lying to the left of the cut-off probability, s, and is given by:

$$H = \int_0^s f_1(S,t)dS. \tag{10}$$

The proportion of firms which are forecast to leave Chapter 11 with no value to shareholders, but in fact leave with value, is known as the false alarm rate, F. This represents that part of the survivor's probability density function, $f_0(S,t)$, lying to the left of the cut-off probability, s, and is given by[14]:

$$F = \int_0^s f_0(S,t)dS. \tag{11}$$

There are several options available to ascertain the appropriate shape of the probability density functions, for the purposes of calculating H and F. First, in the absence of information as to the true shape of the probability density function, one can assume that they possess a certain shape. Panel A of Figure 1 provides a hypothetical representation of the signal detection model, where $f_1(S,t)$ and $f_0(S,t)$ are assumed to be normally distributed, albeit truncated at zero and one.

Second, one can fit a distribution to the data. Panels B and C of Figure 1 present the actual and fitted distributions of $f_1(S,t)$ and $f_0(S,t)$, respectively, for failure time, t, equal to 425 days and where $S(t)$ is calculated using the 2-variable model on estimation sample firms. The thick line represents a fitted beta-general distribution of the probability density function. Third, empirical (actual) distributions can be used. This is represented in Panels B and C of Figure 1 by the frequency histogram, adjusted to possess an area of one under the distribution, so as to represent a probability density function. Immediately apparent from Panels B and C of Figure 1 is that there is substantial overlap between the probability density functions for survivors and failures. Consequently, a clean separation of the two groups based on a cut-off probability is not feasible.

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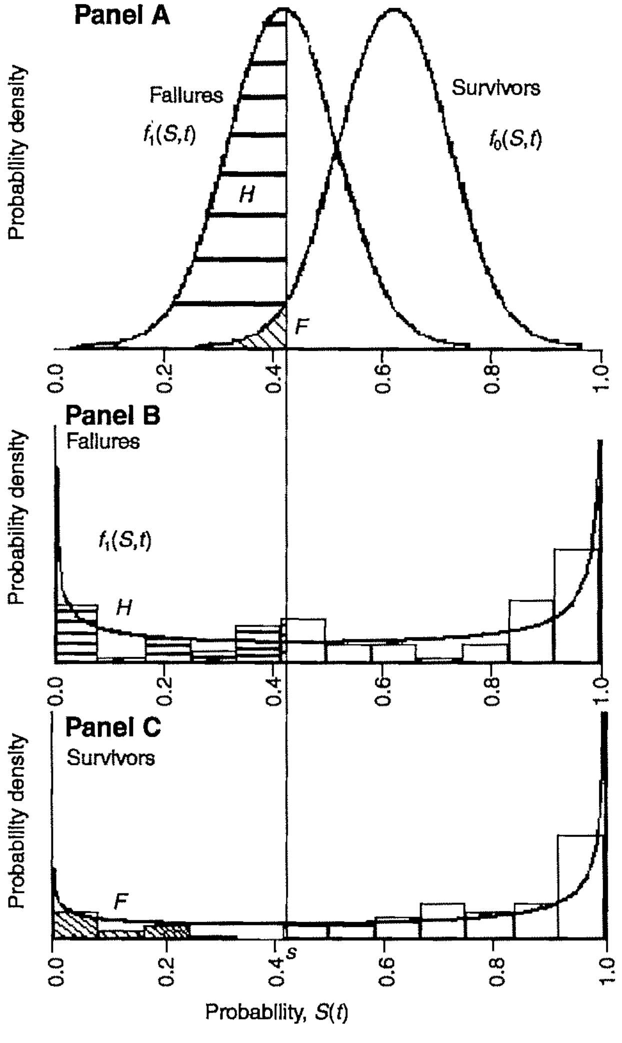
[14] Note that both probability density functions are truncated at a lower bound of zero and an upper bound of one. These truncation points correspond to the lower and upper probabilities that are the extreme values of the survival probabilities for a firm at a particular failure time. These probabilities form a continuum along the horizontal axis of Figure 1.

FIGURE 1

SIGNAL DETECTION MODEL



Panel A presents (hypothetical) normal probability density functions of survivors and failures. Panels B and C present actual probability densities of failures and survivors respectively. The empirical probability densities are based on survival profiles of estimation sample firms using the 2-variable model with $t = 425$. The vertical line running through the panels represents an illustrative cut-off probability, s, slightly above 0.4. The proportion of failures (survivors) lying to the left of the line represents the hit rate, H (false alarm rate, F). As the cut-off probability increases (shifts to the right), more failures are accurately classified. However, a greater number of false alarms are generated. Therefore, H and F increase with s. The thick line on Panel B and C represents a fitted beta-general probability density function.

It is also apparent from Figure 1 that the hit rate, H, and the false alarm rate, F, increase with increases in the cut-off probability, s. Given the null hypothesis (H_0) that the firm will not experience the event, the false alarm rate, F, is equivalent to the probability of a Type I error, while the hit rate, H, is equivalent to the power of the test (Mason, 2003). $1\text{-}H$ is the probability of a Type II error, which is the unhatched part of the failures distribution, $f_1(S,t)$, in Panel B of Figure 1. As with general hypothesis testing, there is a trade-off between F and H. In fact, it is only possible to fix one of these parameters since, conditional on knowing the probability distributions of F and H, setting one automatically determines the value of the other variable (see Panels B and C of Figure 1). The determination of an optimal cut-off probability depends on the combination of F and H the decision maker is willing to accept, given the relative cost of Type I and II errors. Unfortunately, quantifying these costs is a difficult task and it has not been adequately estimated to date.

ROC curves plot the combinations of F (X-axis) and H (Y-axis) as s varies along the probability continuum. ROC curves bypass the problem of determining a (single) optimal cut-off probability by examining the predictive power of the model across the entire spectrum of possible cut-off probabilities. Perfect discriminating power is represented by an ROC curve that rises along the left-hand axis and across the upper horizontal axis. A 45° diagonal line provides the ROC curve for forecasts that represent a random selection of failures and survivors. Models which plot on this line have no predictive ability. Most models would be expected to plot somewhere between these two extremes.

The ROC curves of the within-period and out-of-period survival functions are presented in Figure 2. An issue to be addressed is the choice of which set of survival probabilities to select from the time profile. To assess the sensitivity of the results to this particular choice, several time profiles were examined. Time profiles were considered for t equal to 200, 425, 608 and 803, that correspond to approximate multiples of 200 days.[15] The results were not sensitive to the choice of time profile. This is an encouraging result, since the choice of time profile can be a relatively arbitrary decision. In the interests of brevity, we report only the ROC curves for $t = 425$.

In the within-sample (Lachenbruch) tests, the models—particularly the PRST model—perform better than the random benchmark at most cut-off probabilities. However, it is apparent that the models do not predict well out of sample. The curves plot either around the diagonal or below it and the PRST model performs worst.

Mason (2003) argues that ROC curves below the diagonal have the same discriminating power as if reflected above it. The problem is one of calibration, and those that are forecast to fail should be forecast to survive and vice versa. Applying Mason's correction creates the perverse result where those with a higher probability of survival should be forecast to fail (and vice versa). Therefore, one

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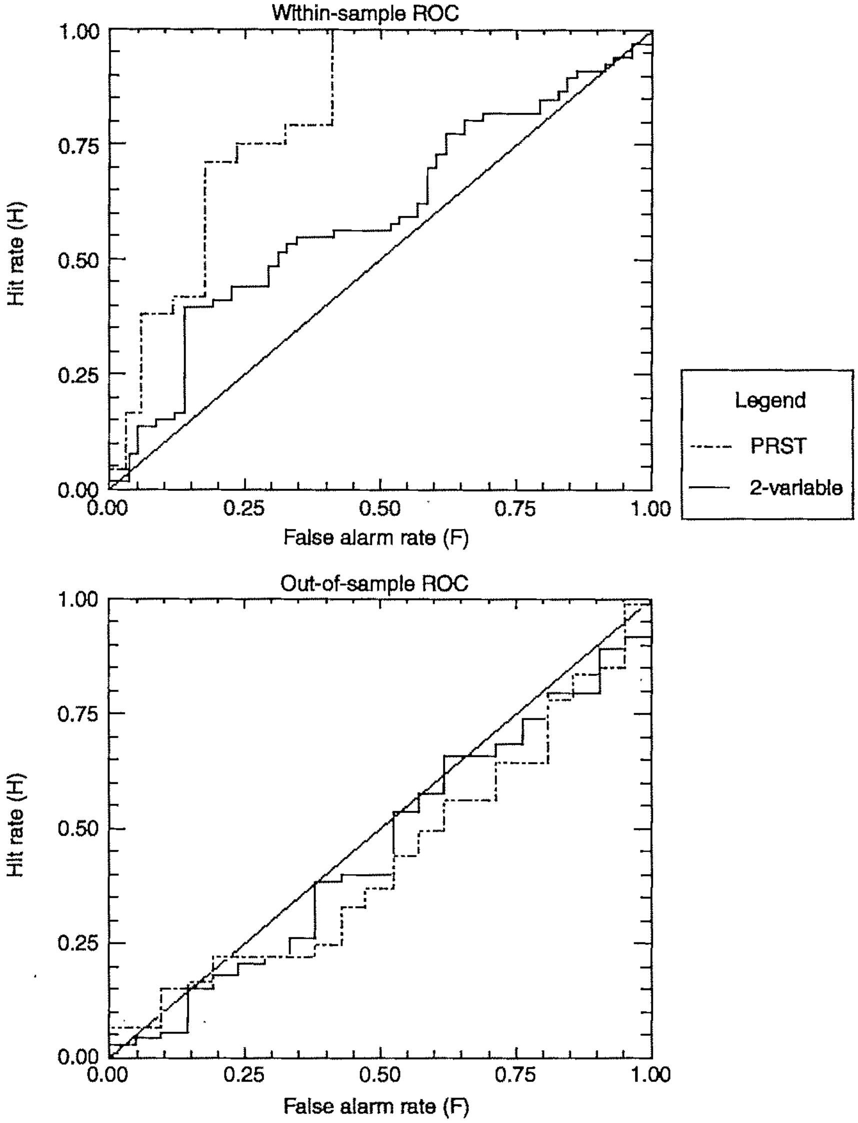
[15] It was not possible to consider exact multiples of 200 since survivor probabilities are only available at each failure time.

FIGURE 2

WITHIN-SAMPLE (LACHENBRUCH) AND OUT-OF-SAMPLE ROC CURVES FOR THE PRST AND 2-VARIABLE MODELS
(Survivor probabilities were taken at $t = 425$ days)



can only conclude that the models are poor predictors of shareholder returns outside the estimation period, performing worse than a randomly allocated forecast.

Several explanations of the out of sample predictive failure are possible. Perhaps there are missing variables leading to unobserved heterogeneity in the underlying hazard. Further, there might be structural breaks which lead to non-stationarity in the underlying hazard, or to changes in the covariate component of the model. For example, business cycle effects may not be captured by the two market wide covariates. Indeed, Flynn and Bermant (2004) show that the period 1997–99 coincides with a shift in the filing cycle, with the percentage change in bankruptcy filings switching from positive to negative. Nevertheless, the predictive failure shows that the results of Chapter 11 bankruptcy studies may be sensitive to the period under analysis. It also seems that Chapter 11 bankruptcy is a more nuanced process than the descent into financial distress. While persistent results are documented in the financial distress prediction literature,[16] this is not mirrored in this study.

CONCLUSION

This study extended and tested a model developed by PRST that was designed to predict whether shareholders would receive any value upon a firm's exit from Chapter 11 bankruptcy. That model consisted of five covariates, representing the firm's liquidity, profitability, size and two economic indicators. The extension was accomplished by incorporating an extra three years' worth of data into the estimation process, increasing the sample size to 125 from fifty-nine. The results show that the model's parameters were not stable over time, with three of the five covariates losing statistical significance once all data were utilized. The covariates that retained significance were $Log_e\ MV$, a firm specific variable, and credit spread, an economic variable.

Some comments are relevant concerning these results. First, all the accounting variables dropped out of the model. It is not clear whether this is a product of uninformative accounting, or some other factor. However, there is a long tradition in the accounting literature from the work of Briloff (1972) and Chambers (1973) to Clarke *et al.* (2003) which points to the obfuscatory nature of accounting data and published reports. This obfuscation may be a contributor to the poor performance of models of financial distress.

Second, the result is consistent with market efficiency in that the market value of the firm immediately prior to entering Chapter 11 was the strongest indicator of whether shareholders would obtain any value at the conclusion of Chapter 11. Third, as the credit spread widened, the chances of exiting Chapter 11 with value for shareholders increased. This was a consistent result across all models and periods. We favour the explanation that creditors might bargain less hard in order to get a speedy resolution to Chapter 11 when default conditions worsen. If this is correct, future research should consider whether incorporating bargaining strategy into financial recovery models improves predictive performance.

Another contribution of this work is the testing of two of the assumptions of Cox's proportional hazards model. The test of Grambsch and Therneau (1994) assessed the assumption of proportional hazards, while Allison's (1984) sensitivity analysis tested the assumption of independent censoring. Both models conformed to the assumption of proportional hazards, while only the 2-variable model exhibited independent censoring. The fact that the PRST model did not conform to the assumption of independent censoring, and the subsequent poor out-of-sample results, highlights the importance of testing the assumptions of Cox's proportional hazards model. It is hoped that this study will encourage researchers to undertake the relevant tests, whenever they apply this methodology.

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[16] For example, the importance of profit to financial health is documented by Altman *et al.* (1977), Ohlson (1980), Mckee and Greenstein (2000) and Shumway (2001).

Finally, the predictive ability of the models was assessed using ninety-four firms that entered Chapter 11 bankruptcy in the period 1997–99. Using the methodology of ROC curves derived from signal detection theory, the models were found to perform very poorly out-of-sample. This contrasts with the in sample (Lachenbruch) predictive tests, which suggested that the models had predictive power. The conclusion, therefore, is that in this context Lachenbruch tests can be very misleading and true out-of-sample tests are required in order to assess predictive accuracy.

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APPENDIX

SCALED SCHOENFELD RESIDUALS

Much of the following explanation draws upon Schoenfeld (1982), Grambsch and Therneau (1994) and Box-Steffensmeier and Zorn (2001).

Andersen and Gill (1982) were the first to recognize that Cox's proportional hazards model is analogous to a specialized 'counting process'. Therefore, consider each firm to be an observation in a Poisson process $\{N_i(t), t \geq 0, i = 1, \ldots, n\}$. This has an intensity function:

$$Y_i(t)e^{\beta' z_i(t)}\lambda_0(t),$$

where $Y_i(t)$ is a dummy variable that indicates whether the ith firm is at risk at time t, β is a vector of coefficients on the vector of $z_i(t)$ covariates and $\lambda_0(t)$ is an unspecified baseline hazard function. For time-invariant covariates, $z_i(t)$ is constant for all failure times (that is, $z_i(t) = z_i$ for all t).

The conditional weighted mean of the covariate vector at time t is:

$$M(\beta,t) = \frac{\sum_{i=1}^{n} Y_i(t)e^{\beta' z_i(t)} z_i(t)}{\sum_{i=1}^{n} Y_i(t)e^{\beta' z_i(t)}}.$$

The variance matrix of the covariate vector at time t is:

$$V(\beta,t) = \frac{S^{(2)}(\beta,t)}{S^{(0)}(\beta,t)} - \left(\frac{S^{(1)}(\beta,t)}{S^{(0)}(\beta,t)}\right)^{\otimes 2},$$

where

$$S^{(r)}(\beta,t) = \sum_{i=1}^{n} Y_i(t)e^{\beta' z_i(t)} z_i(t)^{\otimes r},$$

for $r = 0, 1, 2$. In the case of a column vector a, $a^{\otimes 2}$ denotes the outer product aa', while $a^{\otimes 1}$ denotes the vector a, and $a^{\otimes 0}$ equals the scalar 1. β is estimated by fitting a Cox model and maximizing the appropriate log partial likelihood (Cox, 1972).

The vector of Schoenfeld residuals for each failure time k for each covariate is defined as:

$$r_k(\beta) = \int_{t_{k-1}}^{t_k} [z_{(k)} - M(\beta,t_k)]dN_i(t).$$

A residual can be interpreted as the deviation of the covariate value at a given failure time from its conditionally weighted expected value. Grambsch and Therneau (1994) weight each of these Schoenfeld residuals by the appropriate variance-covariance matrix and define these as the scaled Schoenfeld residuals:

$$r_k^* = V^{-1}(\beta,t_k)r_k(\beta).$$

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Discussion of Wong *et al.*

This paper carries out what is generally termed a survival analysis, that is, it examines the length of time that elapses before a particular 'event' occurs. In this case, the event analysed is the exit of a firm from Chapter 11 of the U.S. *Bankruptcy Code* returning zero value to shareholders. The statistical methodology employed by the paper is the Cox proportional hazards model (CPHM). The dependent variable is the time between the date the firm filed for Chapter 11 and the date the court confirmed the reorganization plan. Five independent variables (often referred to as 'covariates' in survival analysis) are used in the survival model: the firm's market value, a measure of the firm's liquidity, and a measure of the firm's profitability (collectively referred to as the accounting variables); the default spread, and the term spread (collectively referred to as economic variables). The paper is basically a (significant) extension of the authors' previous work in Partington *et al.* (2001). The present paper expands and updates the data set from the earlier paper, scrupulously tests the assumptions of the CPHM (i.e., proportional hazards and independent censoring), and uses both within-sample and out-of-sample tests of predictive accuracy. In sum, the paper is a very careful empirical analysis. The empirical results, however, are somewhat disappointing: several of the covariates become statistically insignificant with the expanded data set, tests for independent censoring produce conflicting answers, and the model predicts very poorly out of sample.

I shall begin my remarks by discussing the pros and cons of the CPHM, which, as the authors point out, is not widely used in the finance literature. I shall then proceed to offer some suggestions about how the predictive power of the model might be improved, and possible avenues the authors might wish to explore further with the data they have so carefully assembled. I shall finish the commentary by illustrating some alternative survival analysis techniques using Canadian micro-data on reorganizing firms.

The proportional hazard models (PHM), of which the CPHM is a special case, are widely used in other fields of research, such as economics (e.g., to study the duration of unemployment spells), political science (e.g., to study the duration of a party leader's tenure), medicine (e.g., to study the time to death of a patient), and marketing (e.g., to study the time between purchases of a good). Why is the PHM so widely used? The approach has a number of useful features. To study the occurrence (or not) of a particular event, logit (or probit) estimation techniques can be used. However, the logit ignores potentially useful information on the duration of time leading up to the event. Second, the logit requires an assumption

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about distributional properties of the data, which is not required with the CPHM. Lastly, while one could use OLS to estimate a duration regression, a common problem with survival data is the presence of censored observations, which, in the present context, are firms that outlive the sample period. If it is the case that the censored observations are more likely to return zero value to shareholders, then the sample of uncensored firms is not random and OLS estimates of duration using only the censored observations are not consistent. The PHM deals with the censoring issue explicitly, resulting in consistent estimates of the underlying effects of the covariates on duration.

The PHM does have some drawbacks as well. First, the researcher needs data on the length of time until the event of interest occurs. In the context of Chapter 11, the researcher needs to know exactly when bankruptcy begins and when it ends. But when, exactly, does bankruptcy begin? Legally, bankruptcy begins when the firm files its reorganization plan. However, the actual event of insolvency occurs prior to filing, on a date that may be very hard to pin down in the data. To be fair to the paper, most researchers in the area ignore this issue and, given the absence of a suitable alternative, define the start of reorganization as the date of filing for Chapter 11. A second drawback with the standard PHM is that the covariates remain constant over time. That is, the covariates corresponding to a particular firm's duration are measured at the time the firm files for Chapter 11 (or just before that date). In practice, of course, a Chapter 11 bankruptcy may last several years. Thus, over the duration of the reorganization, the covariates will change as duration evolves. The empirical analysis does not allow for this, however, and treats the covariates as being permanently fixed as of the time of the event.

Apart from the drawbacks with the PHM approach, I have a number of specific comments about the paper. When it comes to the prediction phase of the analysis, the authors use survival probabilities to predict which firms will exit with a zero value to shareholders and which will exit with a positive value to shareholders. Thus, the CPHM is used to predict survival probabilities rather than the time to exit. There is nothing wrong with this, of course, but given that the paper is keen to exploit duration data on Chapter 11 firms, it would seem more natural to examine predicted time to exit. It would be quite easy for the authors to predict time to exit and compare it with actual duration in the sample and out-of-sample data, along the lines of the Whalen (1991) study of U.S. bank failure.

Further, given that survival analysis is relatively unfamiliar to readers in the area, it might be useful to compare estimates of survival probabilities to those from, say, a logit model, which could also be used to predict the outcome of Chapter 11. This would provide a familiar benchmark for readers and, more importantly, allow readers to judge for themselves the extent of value added from the hazard function approach employed in the paper.

There is another reason why survival analysis is useful: It can be used to study the issue of duration dependence. Bandopadhyaya (1994) reports that the hazard function for Chapter 11 firms exhibits positive duration dependence, which means that the probability of exit from Chapter 11 increases the longer the firm spends in the procedure. By contrast, Li (1999) finds that the hazard function is hump-shaped:

The probability of exit increases up to twenty-one months from filing and decreases towards zero thereafter. Thus, there is a disagreement in the literature about duration dependence in Chapter 11, which the authors could examine. However, if the authors were to investigate duration dependence, they would have to drop the CPHM specification. As pointed out by the authors, one of the advantages of the CPHM is that, because the underlying hazard function is never estimated, no assumption has to be made about its functional form. The obvious drawback with not specifying the functional form of the hazard function is that issues about duration dependence cannot be investigated. The empirical researcher faces a trade-off: Investigating issues about duration dependence comes at the cost of a less general hazard function model.

The data in the paper only comprise confirmed Chapter 11 cases. However, to the extent that the authors are concerned with evaluating the possibility of shareholders earning a zero return in Chapter 11, it would not seem to be prudent to ignore failed Chapter 11 reorganizations, which also return nothing to shareholders. At the very least, the authors need to convince readers why ignoring the unconfirmed Chapter 11 cases does not matter.

Lastly, the estimates from the hazard function clearly suffer from specification problems. While the original Partington *et al.* (2001) estimates of the hazard function provide a reasonable fit to the data in which all of the covariates are statistically significant, the estimates with the expanded data set quickly deteriorate as the data for subsequent years are added to the analysis. The list of covariates used to explain duration is very short: three accounting variables and two economic variables. Many other studies in the area have used industry-specific explanatory variables—such as dummy variables, rates of capacity utilization, and demand growth—to good effect. Economic theory may also provide a useful list of explanatory variables. The White (1983) model of Chapter 11 shows how asymmetries in the negotiating and controlling abilities of equity, secured creditors, and unsecured creditors can lead to inefficient outcomes in reorganization. The model is used by Casey *et al.* (1986) to select explanatory variables to estimate the probability that a bankrupt firm chooses reorganization over liquidation.

In summary, I have a number of suggestions for the authors. I was unable to find any descriptive statistics on the duration data anywhere in the paper, despite the fact that duration is the focus of the study. I think the authors could also investigate the issue of duration dependence in the data, although this would require estimating a parametric hazard function and, as such, would come at the cost of impacting on the generality of the model. Possible extensions would be to consider using a hazard function procedure that permitted the use of time-varying covariates and to use a procedure that would allow some control for unobserved heterogeneity in the data. Again, however, I recognize that in order for either extension to be feasible would require a parametric hazard function to be estimated, and is subject to the loss of generality mentioned above.

Before I finish my commentary, I would like to thank the authors for having inspired me to re-examine my own data and look at the issue of duration in reorganization. In fact, the following will serve as an example of how one could

TABLE 1
CHARACTERISTICS OF 261 REORGANIZING FIRMS AND REORGANIZATION PLANS FILED UNDER THE *BANKRUPTCY ACT*, CANADA, 1977–88

Variable	Mean	Std dev.	Minimum	Maximum
Success (dummy)	0.747	0.435	0	1
Days in reorganization	1,079.800	772.996	70	5,057
CA/CL	0.550	0.373	0	2.290
(S + P)/CL	0.372	0.264	0	0.975
Return to creditors	0.361	0.286	0	1.240
Cash up-front	0.544	0.438	0	1.000
Days, filing to voting	44.318	63.459	1	505
Corporation (dummy)	0.828	0.378	0	1
Montreal (dummy)	0.640	0.481	0	1
Unemployment rate change	0.220	0.972	–1.4	3.4

use bankruptcy data to estimate a parametric hazard function in order to examine the issue of duration dependence, one of the suggestions I made above. The data I shall investigate have been used elsewhere (Fisher and Martel, 2004) and comprise firm-level information on 261 firms going through the financial reorganization procedure under the Canadian *Bankruptcy Act* between 1977 and 1988. I examine here a slightly different question from the paper I have commented on: namely, the duration for a firm to complete the reorganization process and be discharged from bankruptcy.[1] Table 1 provides some descriptive statistics from the data.

The size of the firms in the data is quite small: Average assets are roughly $2 million.[2] Thus, firms in the sample are SMEs, as opposed to the type of firms analysed in Wong *et al.* (2007). This is explained by the fact that my data were randomly selected from the population of firms undergoing financial reorganization in Canada. In contrast, many studies of bankruptcy—including Wong *et al.* (2007)—deliberately over-sample firms with publicly held stock. Table 1 shows that the average firm spends 1,080 days (two weeks shy of three years) between filing for reorganization and exiting the process as a solvent firm. Further, about 75 per cent of firms in the sample exit the reorganization process as ongoing enterprises; the remaining 25 per cent of firms are liquidated. This gives us the censoring in the data: The 25 per cent of failed firms represent instances where the duration of time to consummation is not observed owing to failure. The covariates for hazard function estimation are also shown in Table 1. They include financial ratios

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[1] In Chapter 11, which is very similar to the Canadian process, the corresponding time would be referred to as the time between filing and consummation.

[2] This is not reported in Table 1. The unit of account is 1997 Canadian dollars.

(current assets to liabilities, current secured and preferred claims to total liabilities), features of the reorganization plan (the per-dollar return offered to creditors, the proportion of the return that is paid in cash, the time between filing by the firm and voting on the plan by creditors), and several predetermined variables (whether the firm is a corporation,[3] whether the plan was filed in Montreal,[4] and the change in the unemployment rate over the quarter prior to filing).

I estimate two parametric hazard functions: the hazard function of the Weibull distribution and the hazard function of the Log-logistic distribution. Respectively, these are given:

$$h(t, X) = \gamma\lambda^{\gamma}t^{\gamma-1}$$

and

$$h(t, X) = \frac{\gamma\lambda^{\gamma}t^{\gamma-1}}{1 + (\lambda t)^{\gamma}},$$

where $\lambda = \exp\{-(\beta_0 + \beta_1 x_1 + \ldots + \beta_K x_K)\}$ for the K covariates in the model. The scale parameter λ captures the effect of a given covariate on the hazard rate (the duration). Thus, a positive β_i implies that x_i has a negative effect on the hazard, and hence a positive effect on duration in reorganization. The shape parameter γ captures the time evolution of the hazard. In the Weibull case, $\gamma > 1$ implies positive duration dependence, that is, the probability of a firm exiting reorganization increases as the time the firm spends in reorganization increases. In the Log-logistic case, $\gamma \leq 1$ implies negative duration dependence, and $\gamma > 1$ implies the hazard is hump-shaped, increasing from period 0 to a maximum at period $t^* = (\gamma - 1)^{1/\gamma} / \lambda$, then declining towards zero thereafter.

Table 2 shows the results from estimation of the logit model for successful reorganization, OLS estimation of duration in reorganization, and the estimation of the two hazard functions. The logit results, which of course examine the probability of a successful exit from reorganization without taking into account any duration information, show strong negative effects on the exit probability for firms with higher secured claims, firms filing in Montreal, and firms filing when the unemployment rate is rising. Higher up-front cash payments increase the probability of successful exit, which is consistent with firms using cash payments to signal viability to creditors. The OLS estimates, which are inconsistent due to the presence of censoring in the data, give an idea of the relationship between the covariates and time in reorganization.

The focus of interest is the two right-hand columns in Table 2, which show the hazard function estimates. The effects of the covariates are very similar across the Weibull and the Log-logistic specifications, although the log-likelihood value is higher for the Log-logistic hazard. In general, both sets of estimates are very strong: Six of the eight covariates are statistically significant for the Log-logistic estimates. Time in reorganization is estimated to increase with the proportion of

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[3] Examples of firms that are not incorporated include partnerships and sole proprietorships.

[4] The sample includes plans filed in Toronto and Montreal, which together account for about one-third of all reorganization filings in Canada.

TABLE 2

ESTIMATES OF THE SUCCESS LOGIT, TIME IN REORGANIZATION (LN) REGRESSION, AND HAZARD FUNCTION MODELS

Variable	Logit	OLS	Hazard function	
			Weibull	Log-logistic
CA/CL	0.175* (0.094)	−0.321** (0.146)	−0.528*** (0.182)	−0.578*** (0.191)
$(S + P)/CL$	−0.325*** (0.124)	0.640*** (0.191)	1.079*** (0.245)	1.061*** (0.238)
Return to creditors	0.063 (0.094)	0.206 (0.159)	0.102 (0.159)	0.028 (0.178)
Cash up-front	0.324*** (0.061)	−0.575*** (0.098)	−0.871*** (0.120)	−0.831*** (0.117)
Days, filing to voting	−0.005 (0.034)	0.212*** (0.057)	0.185*** (0.069)	0.207*** (0.067)
Corporation (dummy)	−0.069 (0.060)	0.181 (0.112)	0.171 (0.120)	0.254* (0.133)
Montreal (dummy)	−0.187*** (0.048)	0.281*** (0.090)	0.341*** (0.098)	0.388*** (0.106)
Unemployment rate change	−0.058*** (0.027)	−0.005 (0.044)	0.045 (0.054)	0.070 (0.054)
Constant		5.855*** (0.250)	6.580*** (0.319)	6.094*** (0.285)
γ			1.510*** (0.105)	2.273*** (0.152)
R^2	0.191	0.198		
ln L			−277.240	−268.605

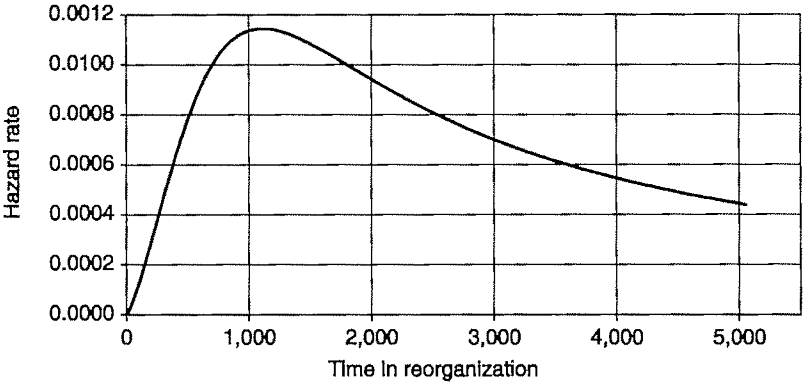
Coefficients (with standard errors in parentheses) for all models except the logit, where marginal effects (and standard errors) at the mean values are reported. $N = 261$. *** (**, *) denotes statistically significant at the 1% (5%, 10%) level (two-tailed test). The pseudo-R^2 is reported for the logit model.

secured claims and with the time between filing and voting. Plans filed in Montreal and by corporations are likely to last longer. Time in reorganization decreases with the current ratio of assets to liabilities and the proportion of up-front cash payments.

Note that the unemployment rate has no effect on duration whereas it significantly affected the probability of exit. This illustrates the kind of subtleties in the reorganization process that can be missed by using the logit model or hazard approach in isolation. While exit probabilities are higher for firms filing during periods of low unemployment, which might lead one to anticipate that such firms would exit sooner, this is not reflected in the hazard function estimates. The state of the economy affects the likelihood that a firm will emerge successfully from reorganization, but not the time a firm that does emerge successfully actually spends in the process. Similarly, a longer time between filing and voting has no effect on the probability of successful exit but significantly increases the duration of the reorganization process.

FIGURE 1

ESTIMATED LOG-LOGISTIC HAZARD FUNCTION FOR TIME IN REORGANIZATION (DAYS), CANADA, 1977–88



The parameter γ is of interest because it indicates how the shape of the hazard function depends on duration. For the Weibull, the estimate of γ is significantly different from 1, implying positive duration dependence for the hazard, which is the same result reported by Bandopadhyaya (1994) for Chapter 11 firms. For the Log-logistic, which has a higher log-likelihood value, the estimate of γ is also significantly different from 1, implying the hazard is hump-shaped. Thus, the representative firm has an increasing hazard until 1,112 days (t^*), after which the probability it exits from reorganization decreases towards zero. Li (1999) finds the same effect for Chapter 11 firms. Figure 1 shows a plot of the Log-logistic hazard function against time in reorganization, showing the hump-shaped duration dependence.

The analysis of the Canadian reorganization duration data is not nearly as complete as that provided in Wong *et al.* (2007) for the Chapter 11 data. I have not tested for independent censoring, nor have I tested the proportional hazards specification. Further, I have not used the estimates to generate predictions, nor have I subjected the hazard estimates to evaluation using a hold-out sample. The motivation for the empirical analysis is merely to illustrate the advantages of using a parametric hazard function—that of being able to consider the issue of duration dependence—and to contrast the hazard function estimates with the logit model.

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Explanators of Local Government Distress

This article develops a statistical model to explain sources of distress in local government. Whereas 'financial distress' in the private sector has been equated with a failure to meet financial commitments, here 'distress' is interpreted as an inability to maintain pre-existing levels of services to the community. Since the late 1990s local councils in an Australian state (New South Wales) have been required to estimate the cost of restoring infrastructure assets to a satisfactory condition (a requirement which predates that form of reporting on infrastructure condition introduced as an option in U.S. GASB 34). Information regarding the cost of restoring infrastructure is used in this study as a proxy for *levels* of distress (in contrast to the binary classification that characterizes much of prior private sector financial distress research). Data regarding service levels for a sample of 161 councils for 2001 and 2002 were used and a multiple regression model was estimated and interpreted. The main findings were that the degree of distress in local councils is positively associated with the size of the population they serve and the size and composition of their revenues. Road maintenance costs featured prominently in results, as higher road program costs were associated with higher levels of distress (particularly when interacted with other variables). However, the revenue generating capacity of councils had the strongest statistical impact on local government distress. Councils with lower percentages of rates revenue to total revenue and lower ordinary revenue levels to total assets were typically identified as more distressed. However, no systematic evidence was found that rural councils have higher distress levels than urban councils (i.e., both rural *and* urban councils serving larger populations were relatively more distressed than councils serving smaller populations). It is suggested that the model (or modifications thereof) may serve as an early warning system for those monitoring the circumstances and performance of local governments.

Key words: Distress prediction; Local government; Model; Satisfactory condition.

Following the new millennium collapse of many major corporations, including Enron, WorldCom, Global Crossing, Adelphia Communications, Vivendi and, in Australia, HIH, One.Tel, Pasminco and Ansett (just to mention a few), there has been a resurgence of interest in various aspects of corporate distress modelling (e.g., Altman, 2001). Distress predictions have been used widely for a variety of screening and monitoring purposes, such as going concern assessments by auditors, assessment of loan default by lenders and corporate health assessments by credit

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rating agencies and regulators. More recently, distress forecasts have been used extensively in the measurement of portfolio risk, and in the pricing of corporate and sovereign bonds, including off-balance sheet financial instruments subject to credit risk, such as collaterized debt obligations (e.g., Altman, 2001; Duffie and Singleton, 2003; Jones and Hensher, 2004).

However, the main focus has been on corporations in the private sector, and in particular, on those corporations whose securities are publicly traded—possibly because financial and market data about these firms were readily available. In this context, 'distress' has been variously interpreted as being evidenced by voluntary or creditor-induced administration (bankruptcy), default on a loan repayment, failure to pay a preference dividend (or even a reduction in the amount of ordinary dividend payments), share issues specifically to meet shortfalls in working capital, financial reorganization where debt is forgiven or converted to equity, and a failure to pay listing fees (e.g., Foster, 1986; Lau, 1987; Bahnson and Bartley, 1992; Ward, 1994; Jones and Hensher, 2004).

Here concern is with distress in the *public sector*, with a focus on local government in the state of New South Wales.[1] 'Distress' is interpreted as an inability to provide services at pre-existing levels. In order to provide services to the community, local governments are expected to invest in infrastructure and to maintain legacy infrastructure. Accordingly, the article uses the estimates developed by local governments of the cost of restoring infrastructure to a satisfactory condition as a measure of degrees of 'distress'. As such, the study uses a quantitative measure of distress, as opposed to the more limited (and less relevant) binary classification that characterizes private sector distress research.

There have only been limited applications of financial distress models to the not-for profit sector (e.g., Schipper's 1977 analysis of financial distress in U.S. private colleges, and some others listed below). It is acknowledged that there has been extensive analysis of fiscal and financial crises in the local government sector, particularly in the U.S.A. in the wake of the financial problems facing New York city and Cleveland during the 1970s (e.g., Gramlich, 1976; Clark and Ferguson, 1983; Wallace, 1985; Falconer, 1991) and a subsequent spate of major financial crises in the early 1990s (e.g., Gramlich, 1991; Honadle, 2003). Commentators have also examined the financial crises experienced by local governments in a range of other countries (e.g., Carmeli and Cohen, 2001; Bach and Vesper, 2002; Carmeli, 2003). In this context, a financial crisis could involve bankruptcy or loan default (e.g., the cases described in Cahill and James, 2002) but it has also been equated with a series of operating deficits (Cahill and James, 1992; Bach and Vesper, 2002).

The main focus of prior studies has been to explore the *reasons* for fiscal crises—with some commentators attributing these problems to a lack of organizational resources and managerial skills leading to an incapacity to deliver quality services in an efficient manner or to adapt to changing conditions (Carmeli and Cohen, 2001). Others have suggested that distress is a consequence of a failure to adapt to economic downturns in general, or to the financial impact of unfunded mandates, as state governments shifted responsibilities to cities or municipalities without financial compensation or while restricting the capacity of local governments to increase revenues (Falconer, 1991; Beckett-Camarata, 2004). Still others sought to explain local government behaviour in times of financial stress (for a review, see Cooper, 1996), or to describe state responses to municipal crises (see Cahill and James, 1992; *Harvard Law Review*, 1997).

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[1] Australian local governments generally provide a more limited range of services than their counterparts in North America or the U.K. Major responsibilities include provision of local roads, waste removal and maintenance of building controls—but not education, health services or policing. Local councils in rural areas may also maintain water treatment and sewerage facilities, and other forms of transport infrastructure (such as regional airports).

While it appears there have only been limited attempts to predict local government financial distress in the research literature, those with a responsibility to monitor the performance of the local government sector have utilized a range of techniques to identify municipalities that may be facing difficulties. However, one contribution noted that while some jurisdictions have sought to establish early warning systems, 'they may not be functioning as planned' (Cahill and James, 1992, p. 92). Another study reported the development of a simple index based on arbitrary weighting of nine variables (Kleine *et al.*, 2003), and subsequently these authors reported the results of applying this to a sample of Michigan local governments—suggesting that it performed better than Michigan's current system of identifying potentially distressed local councils, apparently via financial statement analysis (Kloha *et al.*, 2005). The claim of superior performance was based on the suggestion that it had 'theoretical validity', produced similar results to the assessments of a state agency, and was parsimonious. A fifty-state survey by Honadle (2003) revealed that just under half of those states made some attempt to predict local government's fiscal crises, mainly through reviewing audit reports, local government reporting, or from information gleaned from discussions or regional workshops, with only some U.S. states using 'financial analysis methods' (p. 1454)—and apparently none using a statistical distress prediction model.

A recent Australian study proposed an econometric distress prediction model and (as with the approach used by Kloha *et al.*, 2005) compared the findings with a 'watch list' compiled by a state government agency—in this case, concluding that the latter's selection of 'at risk' councils did not accurately identify municipalities that were (according to their model) in fact 'at risk' (Murray and Dollery, 2005).

A number of commentaries have acknowledged that reviews of financial statement analysis alone may be a poor basis for predicting local government distress, because financial ratios may show up problems 'too late'. Indeed, Clark and Ferguson (1983) provided extensive evidence to support their contention that fiscal strain reflects the degree to which governments fail to adapt to changes in the resources available to the taxpaying community. That observation in itself highlights the difficulties of applying distress prediction models to the public sector. It is well recognized that, in the private sector, a prediction of distress may not be fulfilled if management takes corrective action. It is also recognized that a major limitation of the distress literature is that many studies have modelled failure as a simplistic binary classification of failure or non-failure (Jones, 1987). This methodology has been widely questioned, because the strict legal concept of bankruptcy (or insolvency) may not always reflect the underlying economic reality of corporate financial distress. For instance, there is considerable documentary evidence that corporations have, from time to time, misused bankruptcy provisions for their own strategic purposes, such as staving off creditors (Lau, 1987; Delaney, 1991). Further, the two-state model can also conflict with underlying theoretical models of financial failure and this can potentially limit the extent to which empirical results can be generalized (Scott, 1981; Bahnson and Bartley, 1992; Lau, 1987; Hill *et al.*, 1996).[2]

If the archetypal two-state failure model is of dubious relevance in the private sector, its application may be even more severely limited in the public sector, where entities that are financially distressed may respond to falls in revenues or increases in costs by reducing the range and quality of services they provide to the community.

Against this background, the objective of this study is to fill a gap in the distress literature by developing a quantitative modelling approach to identify explanators of local council distress. As local councils typically do not fail in the sense of being unable to pay their debts, the aim is not to *predict* financial failure *per se* but rather to identify factors that explain local government distress—interpreted here as an inability of those entities to maintain standards of service.

A statistical modelling approach is arguably superior to more rudimentary and heuristic approaches (such as a financial statement analysis), because it allows the testing of a formal hypothesis and an examination of the statistical and explanatory impact of a range of covariates in a multivariate setting. A quantitative model may have relevance in assisting state or commonwealth agencies overseeing the activities of the local government sector to develop robust early warning systems to identify potentially distressed councils. It may also assist in formulating policies regarding local council mergers or amalgamations, and (for jurisdictions that engage in rate pegging) in reviewing applications for special variations.[3] A quantitative modelling approach can also assist regulators back-test their own 'in house' distress ratings system (such as that undertaken by the N.S.W. Department of Local Government in identifying councils that are 'at risk' of distress).

MEASURING DISTRESS IN LOCAL GOVERNMENT

Previous works have struggled to establish a satisfactory metric for local government distress. For instance, Clark (1977) discussed four indicators of municipal fiscal strain: (a) probability of default, where default is defined as not meeting bond repayments; (b) ratio indicators, such as gross debt divided by the tax base or short-term debt to long-term debt, (c) socio and economic based characteristics, such as population size and median family income, and (d) funds flow measures. However, these measures have certain intractable problems when operationalized as a formal measure of local government distress (particularly in Australia). As noted by Clark, bond defaults may not be useful given that actual default rates have historically been extremely low (see also Kaplan, 1977). Furthermore, the link between bond ratings and financial condition presupposes that capital markets are provided with adequate financial information by local governments (which may be unrealistic given the lack of consistent and transparent financial disclosure in many U.S. local government authorities). Ratio indicators (such as debt to equity) are unsuitable as dependent variables in the modelling of distress for many reasons, including (a) financial ratio indicators used as dependent variables are likely to be correlated, directly or indirectly, with other financial indicators used as independent variables and (b) ratio metrics are not specifically related to the broader non-financial dimensions of local council distress (if interpreted as an inability to maintain the quality of service delivery to the community). Similarly, socioeconomic factors (such as population size) are again more appropriately used as explanatory variables in modelling as these measures do not represent direct measures of local council distress.

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[2] Others have argued that the practical risk assessment decisions by lenders and other parties normally cannot be reduced to a simple pay-off space of failed and non-failed (see, e.g., the discussion in Ohlson, 1980; Ward, 1994; Jones and Hensher, 2004). For instance, firms can experience a range of distress conditions that do not necessarily result in bankruptcy.

[3] Australian local governments are commonly subject to direction from state governments. New South Wales (alone amongst Australian states) subjects local government to a regime of rate pegging, whereby percentage increases in general income are subject to an upper limit unless applications for 'special rate variations' are approved by the Minister for Local Government (*Local Government Act*, ss 505–13).

Another dependent variable that can potentially indicate distress in local councils is the incidence of mergers and amalgamations. The N.S.W. government has encouraged voluntary local council mergers to encourage efficiencies. For instance, the *Local Government Amendment (Amalgamations and Boundary Changes) Bill 1999* streamlines the procedures laid down in the *Local Government Act 1993* for voluntary amalgamations of council areas.[4] *Prima facie*, the incidence of mergers and amalgamations represents a potentially attractive dependent variable, as merged councils can be readily identified[5] and typically such merger activity has been motivated by concerns about the financial viability of some local councils.[6] For example, a proposal for creation of a New Capital City Regional council in southern areas of the state would have seen the merger of five smaller councils. A major rationale was described as follows:

> The substantial pool of funds [through consolidating the revenues of all adjacent councils] contrasts with the meagre financial bases that some of the existing Councils possess. It

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[4] Chapter 9 of the *Local Government Act 1993*, Part 1, Areas, and Part 3, Local Government Boundaries Commission, contain information on the constitution, dissolution and alteration of local government areas.

[5] Over the past ten years, around 13 per cent of councils have disappeared through mergers and amalgamations.

[6] S. 263 of the NSW *Local Government Act* requires that the Boundaries Commission has regard to: (a) the financial advantages or disadvantages (including the economies or diseconomies of scale) of any relevant proposal to the residents and ratepayers of the areas concerned; (b) the impact of any relevant proposal on the ability of the councils of the areas concerned to provide adequate, equitable and appropriate services and facilities; (c) the impact of any relevant proposal on the employment of the staff by the councils of the areas concerned; and (d) the impact of any relevant proposal on rural communities in the areas concerned.

> might be noted that two of the five Councils had deficits on ordinary activities in 2002. Gunning (southern half) had a small surplus in 2002, but a large deficit of $244,000 in 2001. Tallaganda had a deficit of $322,000 in 2001. It is clear that four out of the five Councils are operating on very slim margins between revenues and expenditure from ordinary activities. (p. 10 of application[7])

However, there are a number of issues to consider if council mergers and amalgamations are used as the distress metric. Public companies experiencing distress can seek out merger partners in any number of locations, and typically merge with business partners that are in a stronger financial position. However, mergers of local councils in N.S.W. (and elsewhere) are constrained by geographic considerations. Typically, distressed councils merge with adjacent councils that may only be marginally better off in financial terms themselves. Merging two or more financially fragile councils does not necessarily produce one larger 'healthy' council.[8] Most mergers over the recent years in N.S.W. have involved smaller regional councils, and the numbers have been comparatively small in absolute terms (not more than 13 per cent in the past ten years).

Service Delivery as the Dependent Variable

Given the difficulties in operationalizing an appropriate financial distress measure in local councils, this study focuses on constructing a proxy of distress linked to basic operating objectives of local councils, which is to provide services to the community. The major responsibilities of Australian local government are the provision of local infrastructure (such as roads, bridges and community facilities) and waste collection. Local councils are responsible for administering building controls (though in some circumstances these may be overridden by state authorities). In major metropolitan areas the provision of water and sewerage services is undertaken by state agencies, but in rural and regional areas these functions are generally provided by local councils (sometimes through joint ventures). While individual councils may provide some social welfare services, the provision of health and education services is a responsibility of the states, with the Commonwealth government providing earmarked grants to support some services (such as home care programs for the aged or persons with disabilities).[9]

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[7] The application can be located at the following url: http://www.dlg.nsw.gov.au/Files/CommissionsTribunals/BC_Proposal_Capital_City.pdf#xml=http://www.dlg.nsw.gov.au/Scripts/dtSearch/dtisapi6.dll?cmd=getpdfhits&DocId=676&Index=c%3a%5cdtsearch%5cuserdata%5cAllDocuments&HitCount=4&hits=6c+70a+a64+1603+&.pdf

[8] For example, consider the December 2000 proposal to create the new Gwydir Shire Council which combined the Yalloroi, Bingara and part of the Barraba shire councils (the new Gwydir Council was officially formed on 17 March 2004). All three councils were in a fragile financial position—with the Bingara and Yalloroi Shire Councils both showing a deficit in 2002. See their original petition at http://www.dlg.nsw.gov.au/Files/CommissionsTribunals/BC_Proposal_Gwydir_Shire_Council.pdf#xml=http://www.dlg.nsw.gov.au/Scripts/dtSearch.

[9] For a detailed summary of local government functions in Australia, see the *Local Government National Report, 2004–05 Report on the Local Government (Financial Assistance) Act, 1995*, 2006, available at http://www.dotars.gov.au.

Service delivery can be considered in terms of both the *quantity* or *quality* of services provided. In this exploratory analysis, the focus is on *qualitative* aspects of service delivery. A purely quantitative measure of service delivery can result in misleading interpretations of local council distress and may not be, for various reasons, strongly associated with explanators of distress (see Table 2 below). For example, road infrastructure can be provided and/or maintained by a local council, in spite of the fact that road quality itself can be steadily diminishing over time or left in a poor state of repair. Similarly, sewerage infrastructure in a poor state of repair may continue to operate, even though it threatens public health standards and the local environment. An example of why a quantitative measure of service delivery may not be appropriate are the circumstances of Windouran Shire Council in New South Wales. The 'distress' of this council was discussed in the N.S.W. parliamentary debates as follows:

> Windouran's plan to get out of its financial distress was to significantly increase rates each year, rip up the bitumen on some roads and make them all gravel to save maintenance costs, sell all but essential plant and equipment and delay the purchase of new equipment, and consider further reductions in staff. This response demonstrates clearly the seriousness of the situation of Windouran council. Windouran Shire Council has an operating deficit amounting to $1,251 for each man, woman and child in the shire. (*Hansard*, NSW Legislative Assembly, 11 November 1999, p. 2786).

It has been suggested that local government fiscal stress may lead to a decline in maintenance expenditure on infrastructure and a decrease in capital investment on infrastructure in order to finance other expenditures (Bumgarner *et al.*, 1991). This article interprets a decline in expenditure on infrastructure—and a corresponding increase in the funding required to restore the functionality of infrastructure assets—as a proxy for distress, as local government entities fail to allocate sufficient funds to adequately maintain that infrastructure.

Information concerning the funding required to restore the functionality of infrastructure is available in N.S.W., since the 1993 legislation required local councils to assess and report to the Minister for Local Government whether their infrastructure (in four categories) was in a satisfactory condition, and if not, the estimated cost of bringing that infrastructure to a satisfactory condition. Further, councils were required to provide estimates of the (hypothetical) cost of maintaining those assets in a satisfactory condition, together with particulars of the current-year budgetary allocations for maintenance.

Subsequently other standard setting bodies—including the U.S. Federal Accounting Standards Advisory Board (FASAB, 1996) and the Governmental Accounting Standards Board (GASB, 1996)—have introduced accounting standards requiring some form of reference to infrastructure condition. The FASAB required disclosures related to the condition and the estimated cost to remedy deferred maintenance to property, plant and equipment, while prohibiting recognition of the dollar values of these items in the financial statements (FASAB, 1996). The GASB introduced options for accounting for infrastructure by American states and municipalities: These entities were either to value and then depreciate infrastructure assets, or alternatively, demonstrate that infrastructure assets were being managed using an asset management system, and document that the assets were being preserved approximately at (or above) a condition level established by and disclosed by that government. Whereas the GASB required that state and municipal governments account for infrastructure either through asset recognition followed by depreciation, or through supplementary reporting on infrastructure condition, the N.S.W. local government requirements required *both*, through a combination of the application of Australian Accounting Standards, and supplementary reporting.

It is recognized that a potential limitation of this dependent variable construct is that, in the absence of a standard methodology for defining and measuring 'satisfactory condition', local councils may have widely different interpretations of that concept and use differing estmation methods. An earlier study found that the information reported by councils varied in quality and coverage, and in the interpretations adopted for 'satisfactory condition' (see Walker *et al.*, 1999). However, subsequently the N.S.W. Department of Local Government has provided clearer advice to councils. Further, telephone interviews with several local council managers, accountants and engineers indicate that estimates have been refined over time and (with some exceptions) a greater proportion were 'evidence based' (e.g., underground drainage pipes in metropolitan areas had been inspected with the use of television technology). Another study (Edwards and Walker, 2007, not reported here) suggests that this has led to more consistency in the way in which estimates of the cost to bring assets to 'satisfactory condition' have been reported by councils, as reflected in a reduction of the extent of variations reported from year to year.

METHODOLOGY

Much of the traditional corporate distress prediction literature has employed a variety of discrete choice models, the most popular being linear discriminant analysis and binary logit and probit models (see e.g., Altman, 1968; Altman *et al.*, 1977; Ohlson, 1980; Zmijewski, 1984; Duffie and Singleton, 2003). There has also been a plethora of new modelling approaches in recent years, including structural (or 'distance to default') models and intensity (or reduced form) models (see Duffie and Singleton, 2003, for a detailed review).[10] Furthermore, new research has been conducted into the behavioural performance of advanced logit models, such as random parameters logit (or mixed logit), nested logit models, latent class MNL and kernel logit models (see Jones and Hensher, 2004).[11]

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[10] Under a structural modelling approach (also known as the Black-Scholes or Merton model), the probability of failure is framed around a stochastic model having two crucial inputs: (a) the market value of the firm's assets relative to external debt and (b) volatility of the market value of a firm's assets relative to debt. A popular extension of this basic concept is the KMV (1993) and Kealhofer (1996) model. KMV is based on an empirically determined 'distance from default' which is measured by the number of standard deviations a firm's asset values are currently above/below its external debt level (this is compared to the percentage of firms which actually failed at a given asset to debt level). Reduced form models do not rely on accounting book data (such as debt), but as explained by Duffie and Singleton (2003), these models assume an exogenously specified process for default probabilities which are calibrated for past and current market data. They note that structural and intensity models have been popular in academic research and in practice.

Data Collection and Sample

The sample used in this study is based on the financial statements and infrastructure report data of 172 local councils in New South Wales over a two year period 2001–02. The data collected included local council characteristics (such as whether the council is large or small, or urban or rural, based on formal classifications used by the DLG), service delivery outputs, condition of infrastructure and an extensive range of financial variables (described below). Data were collected from several sources. Infrastructure data were accessed from the 2002 infrastructure reports to the minister on the condition of public infrastructure prepared by New South Wales councils in accordance with the *Local Government Act* of 1993. These reports were provided by the New South Wales Department of Local Government for the population of 172 councils then operating in the state in 2002.

Council background data were collected from a report of *Comparative Information on New South Wales Local Government Councils* prepared by the Department of Local Government (2002). This report contains comparative data for all councils in New South Wales across a series of key performance indicators for the years 1999/2000, 2000/01 and 2001/02. This report was also used to source many of the financial and non-financial variables used in this study. Other financial variables were obtained from the 2001 and 2002 annual reports or financial statements of local councils.

The first stage in the annual report collection process involved searching the websites of the sampled local councils for downloadable copies of their 2001 and 2002 annual reports. The reports of sixty-nine local councils were available online, and these reports were downloaded. The remaining 103 councils were contacted (either via email, telephone or mail) and requested to forward their 2001 and 2002 annual reports. This procedure resulted in 161 useable annual reports. Table 1 summarizes the sample of annual report data collected.

Data integrity checks of data relating to infrastructure condition that had been filed with the DLG identified some significant percentage variations between years. Follow-up enquires to individual councils established that most reflected a failure to 'round' reported data to the nearest $1,000, while other amendments corrected typographical errors by those councils in one or other year.

Definition of Distress

As already described, the definition of distress used here incorporates a qualitative measure of service delivery. This definition is not linked to social service outputs *per se* but to the *condition* of infrastructure assets upon which the delivery of local council services is critically dependent. Levels of distress are defined for this

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[11] In contrast to standard logit models, advanced logit structures, to varying degrees, relax the highly restrictive IID condition (identical and independently distributed errors) and the IIA condition (independence from irrelevant alternatives) assumption. Advanced models also incorporate a rich variety of observed and unobserved firm-specific heterogeneity into model estimation (both between and within firms).

TABLE 1

SUMMARY OF ANNUAL REPORT DATA COLLECTED

Annual report and financial statements received	161
Annual report received without financial statements	3
Annual report not received	8
Total	172
Complete data	146
Incomplete—missing cash flow statements only	13
Incomplete—missing cash flow statements and other data	2
Total	161

purpose as being represented by the estimated cost expected to be incurred by local councils to get infrastructure assets into a 'satisfactory condition'. Specifically, the dependent variable in this study is a continuous variable defined as *the ratio of expected total costs to bring local council infrastructure assets to a satisfactory condition, scaled by total revenues*. Scaling (i.e., dividing) to total revenues is intended to control for size differences between local councils, and is appropriate as general revenue is the primary source of funds available to a local councils to maintain infrastructure in satisfactory condition. Also noted above, many N.S.W. councils (mainly those outside major metropolitan areas) received revenues from charges for water and sewerage services (and these charges are not subject to rate pegging). Accordingly, scaling involved use of total revenues (both excluding and including water and sewerage charges). It was found that scaling total costs to bring infrastructure assets to a satisfactory condition by other denominators (such as operating cash flows or total assets) was highly correlated with total revenues, suggesting that this measure is robust to choice of scale.[12]

Explanatory Variables

A broad range of financial and non-financial measures were tested (see the Appendix for a list of variables and their definitions). The explanatory variables are in four categories: (a) council characteristics; (b) local service delivery variables; (c) infrastructure variables; and (d) financial variables. A brief description and explanation of the choice of variables follows:

Council Characteristics

Local government areas in N.S.W. vary considerably in terms of geography and demography, and encompass areas as small as 5.8 square kilometres (the Sydney suburb of Hunters Hill) to as large as 53,510 square kilometres (the local government area of Central Darling in the far west of the state) (DLG, 2005). Population densities also vary considerably—from 0.11 per square kilometre in the rural areas of Brewarrina and Cobar, to 6,697.85 per square kilometre in the Sydney suburb of Waverley. Such variations would affect both the volume of services to be provided to local communities, and the scale of revenues received by councils, mainly from 'rates' (property taxes based on unimproved capital values). Because of a combination of a lower rate base, smaller staffing levels and the challenge of having to service larger areas, it has been commonly suggested that the local government areas most exposed to financial stresses are in rural and regional areas (and, indeed, the Department of Local Government's 2002 'watch list' indicates that twenty-four of the twenty-six 'at risk' councils are rural or regional).

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[12] The total revenue measure and operating cash flow measure have a coefficient of .82, and the total revenue measure and total asset measure have a coefficient of .66 (both tests are based on a Pearson's r two-tailed test and are significant at the .01 level).

Local councils were classified into eleven major categories in the DLG database:

1 = Capital city
2 = Metro developed—small/medium
3 = Metro developed—large/very large
4 = Regional town/city—small/medium
5 = Regional town/city—large/very large
6 = Fringe—small/medium
7 = Fringe—large/very large
8 = Agricultural—small
9 = Agricultural/Remote—medium
10 = Agricultural/Remote—large
11 = Agricultural—very large

The variables included in the model to reflect council characteristics were as follows:

- whether the council is large or small (a dummy variable describing whether a council is large/extra large or small/medium, based on the DLG classification summarized above, with large councils encompassing categories 1, 3, 5, 7, 10, 11 and small councils encompassing 2, 4, 6, 8, 9);
- whether the council is rural or urban (a dummy variable coded whether council is urban or rural, with urban councils being categories 1–7, and rural councils categories 8–11 in the DLG classification scheme);
- number of equivalent full-time council staff;
- population serviced within local council boundaries;
- number of rateable farmland properties; and
- number of rateable business and rateable residential properties.

Service Delivery Variables

It is commonly suggested that the main issues facing Australian local councils are the 3Rs—roads, rates and rubbish. That label summarizes some of the major responsibilities of the 'third tier' of Australian government—councils are responsible for local roads, and the collection and disposal of waste; unlike local government in some other countries, they are not responsible for health, education, policing or public housing. Australian local governments may also provide a range of other services: Some maintain libraries, swimming pools and sporting facilities, and provide care for the aged or disabled citizens (though the latter services are primarily funded by Commonwealth and State governments). The provision of waste collection services constitutes a material expenditure for the sector. Other services (such as the provision of library facilities) are likely to be less significant.

Accordingly, service delivery variables (using data from the DLG database) were:

- domestic waste pickups per week;
- number of residential properties receiving waste management services; and
- total kilograms of recyclables collected.

Infrastructure Variables

Arguably the largest expenditures of local governments are directed towards providing and maintaining infrastructure of varying kinds. While the maintenance of local roads, other transport infrastructure and drainage systems is a common responsibility, many local councils are also responsible for reticulation of potable water and sewerage (the exceptions being those local government areas serviced by state-owned authorities operating in areas surrounding Sydney and Newcastle).

With this background, the infrastructure variables examined in the analysis were:

- the carrying values for buildings, roads, other transport, water, sewerage and drainage infrastructure;
- estimated costs to bring buildings, roads, other transport, water, sewerage and drainage infrastructure to a satisfactory condition; and
- budgeted maintenance expenditure for buildings, roads, water, sewerage and drainage infrastructure.

Financial Variables

The financial measures used are based on a number of ratio measures examined in the financial distress literature over the last three decades (examples include Altman *et al.*, 1977; Ohlson, 1980; Zmijewski, 1984; Casey and Bartczak, 1985; Gentry *et al.*, 1985; Jones, 1987; Altman, 2001). More recent research has established the importance of operating cash flows in predicting corporate failure (see Jones and Hensher, 2004). Previous U.S. research had only tested estimates of operating cash flows and such proxies have been found to be associated with significant measurement error (see Rebar and Collins, 2002). As Australian accounting standards since the early 1990s have required local councils to prepare detailed cash flow statements prepared using the direct method (see AAS 27, *Financial Reporting by Local Government*, paras 31–32), it was possible to use reported cash flow measures). Financial ratio categories tested here include: operating cash flows (e.g., operating cash flows to total assets); cash position (e.g., cash and short-term investments to total assets); liquidity and working capital (e.g., current ratio); rate of return (e.g., reported surplus to total assets); financial structure (e.g., total debt to total assets); and debt servicing capacity (e.g., operating cash flow to interest payments). Further, several possible interactions of financial and council specific and demographic variables were examined. Testing interaction effects sought to determine whether contextual factors (such as population size or council type) have a moderating influence on the financial variables which enter the model. For instance, it is possible that the size of a council has a moderating influence on the level of indebtedness (larger councils might be more indebted than smaller councils or *vice versa*).

EMPIRICAL RESULTS

Two regression models based on a *quantitative* and *qualitative* measure of service delivery are compared. A quantitative measure of service delivery only considers changes in the physical level of output or services provided to the community by councils (such as the physical number of residential properties which receive a waste management service), whereas a qualitative measure of service delivery is based on the adequacy of services provided, as proxied by the physical condition of assets on which service delivery is critically dependent. As indicated earlier, a quantitative measure of service delivery can lead to misleading interpretations as it may be spuriously linked to financial aspects of council distress and service quality itself. For example, local councils are obliged to collect residential waste products *irrespective* of their financial position or performance. Also, while councils can be maintaining services at current levels, a lack of investment in maintaining critical infrastructure can (potentially) result in a catastrophic drop in service quality in a later period.

In order to examine whether council financial performance is linked to a quantitative measure of service delivery, a service output measure was constructed, based on the annual growth of services provided by local councils over a two-year period (2001–02). This measure of distress includes the following service output variables[13]: number of services (domestic waste pickups per week), total kilograms of recyclables collected, total kilograms of domestic waste collected, and number of residential properties receiving waste management service. A composite of growth in service delivery across these key measures was calculated, and then regressed onto a range of local council financial variables taken over the same period. Table 2 reports the parameter estimates and *t*-values across a number of financial variables, including ratios based on working capital, cash flow from operations, cash position, interest cover, net surplus to total assets and total debt to total assets. Table 2 fails to reveal any statistically significant relationships between these variables and the quantitative measure of service delivery.[14]

In order to test the qualitative measure of distress, a multiple regression model was also estimated. Table 3 displays parameter estimates and significance levels for the final multiple regression model, while Table 4 provides descriptive statistics for the significant covariates in the final model. The final model was selected based on its overall explanatory power and statistical coherence. The regression

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[13] Data were collected from the Department of Local Government (2002).

[14] The results were essentially the same when individual physical output measures (such as change in the number of residential properties receiving waste management service) were used as the dependent variable.

TABLE 2

REGRESSION ANALYSIS FOR QUANTITATIVE MEASURES (I.E., PHYSICAL OUTPUT LEVELS) OF SERVICE DELIVERY

Financial variables	Unstandardized coefficients		Standardized coefficients	*t*-value	*p*-value
	Beta	Std. Error	Beta		
Constant	5.572	5.171		1.078	.283
Current ratio	.518	1.087	.046	.477	.634
Cash flow operations to total assets	.425	1.235	.043	.344	.731
Long term interest bearing debt to total assets	.000	.002	.047	.265	.791
Cash resources to total assets	.100	.560	.018	.178	.859
Interest cover	.000	.000	–.097	–.536	.593
Gross debt to operating cash flow	–.190	.290	–.060	–.655	.514
Operating cash flow to total infrastructure assets	–.022	.263	–.008	–.085	.932
Ordinary revenue (less waste and sewerage charges) to total assets	.727	.977	.232	.745	.458
Total expenditure by total assets	–.912	.965	–.310	–.945	.347
Surplus to total assets	–.159	1.031	–.020	–.154	.878

model in Table 3 has strong overall goodness of fit with an adjusted R^2 of 0.70. It can be seen that all parameters are statistically significant and appear to have logical and consistent signs.

Interpreting the parameter estimates in Table 3, it can be seen that distress in local councils is *positively* associated with the population serviced within local council boundaries and also with the size of local councils (larger local councils are relatively more distressed than smaller councils). The distinction between size of councils (as defined by the DLG classifications) was found to be greatest between large and small *urban* councils. In particular, larger urban councils were found to be significantly more indebted (measured by total debt to total assets), but had relatively stronger operating cash flows, greater revenue generation capacity and higher rates of return on assets (net surplus to total assets). When the financial performance of small and large *rural* councils was compared, all except one variable (the current ratio) were found to be significant (albeit the significance level was marginal at $p < .1$), indicating that larger rural councils had slightly greater working capital than smaller rural councils.

It was found that distress is *negatively* associated with measures based on revenue generation capacity. Councils with lower percentages of rates revenue to total

TABLE 3

REGRESSION ANALYSIS FOR QUALITATIVE MEASURE OF SERVICE DELIVERY

	Unstandardized coefficients		Standardized coefficients	*t*-value	*p*-value	Collinearity statistics	
Variables	Beta	Std. Error	Beta			Tolerance	VIF
Constant	690.8	127.7		5.409	.000		
Population within council boundaries	.001	.000	.565	2.658	.014	.221	4.522
Local council large or small	91.09	34.455	.391	2.644	.015	.456	2.194
Rates revenue to total ordinary revenue	−8.596	1.967	−.601	−4.371	.000	.529	1.890
Ordinary revenue (less waste and sewerage charges) to total assets	−12.297	3.622	−.447	−3.395	.002	.577	1.734
Road program costs over total assets	8026.680	2374.710	.537	3.380	.003	.396	2.525
Number of full-time (equivalent) staff	−.232	.095	−.564	−2.455	.022	.189	5.279
Carrying value — total infrastructure	.000	.000	−.488	−2.434	.023	.249	4.023

revenue and lower ordinary revenue levels to total assets are typically more distressed. Councils with lower staff numbers are also relatively more distressed. Councils with lower carrying values for infrastructure assets were associated with greater distress (lower written down values could suggest that assets are older and possibly in poorer condition). Also, road maintenance costs featured prominently in results—higher road program costs are associated with higher council distress ($t = 3.38$). It was expected that this variable could have important interaction affects with other variables, such as total area (in square kilometres) serviced by the local councils. The results indicated that the interaction of road maintenance costs and area serviced by councils was positive and significant, suggesting that the larger the area serviced by local councils, the greater the impact of road maintenance costs on council distress ($t = 2.21$). Further, the interaction of road maintenance costs and the estimated costs to bring road assets to a satisfactory condition was also positive and significant, suggesting that the poorer the physical condition of road assets (reflected by the higher costs to get assets into satisfactory conditions) the greater the impact of road maintenance costs on council distress ($t = 2.01$).[15]

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[15] Further, the interaction of road maintenance costs and whether a council is urban or rural was found to be positive and significant, suggesting that the impact of road maintenance costs on council distress was greater for urban councils ($t = 2.21$).

TABLE 4

DESCRIPTIVE STATISTICS FOR SIGNIFICANT COVARIATES REPORTED IN TABLE 3

Variables	*N*	Minimum	Maximum	*M*	*SD*
Population within council boundaries	342	1,337	266,072	38,034.06	50,740.5
Size of council (large/small)	65	.00	1.00	.4923	.50383
Ordinary revenue (less water and sewerage charges) to carrying value of infrastructure assets	172	.02	2177.41	30.3511	166.9
Rates revenue to ordinary revenue	342	9.43	72.00	40.96	13.03
Carrying value of infrastructure assets ($000s)	172	1749	76181787	844822	6327203
Road program costs to total assets	159	.00	.53	.0173	.0428
Number of equivalent full-time staff	342	15	1177	232.15	235.72
Total cost to get infrastructure assets (total) into satisfactory condition by total ordinary revenues	172	.00	1330.16	135.5096	155.79047
Total cost to get building infrastructure assets into satisfactory condition by total ordinary revenues	172	.00	46.62	7.2604	9.75211
Total cost to get road infrastructure assets into satisfactory condition by total ordinary revenues	172	.00	1319.04	96.7363	139.94884
Total cost to get water infrastructure assets into satisfactory condition by total ordinary revenues	108	.00	87.56	13.6689	18.81730
Total cost to get sewerage infrastructure assets into satisfactory condition by total ordinary revenues	118	.00	137.14	16.2807	23.31940
Total cost to get drainage infrastructure assets into satisfactory condition by total ordinary revenues	162	.00	399.82	12.4868	35.37008

The highest *t*-values (indicating a stronger statistical influence on distress) were variables associated with revenue generation, particularly the ratio of rates revenue to total revenue ($t = -4.371$) and ordinary revenue (less waste and sewerage charges) to total assets ($t = -3.395$). Again, this result could be directly related to legislative requirements for rate pegging among local councils in N.S.W., which can restrict the capacity of some councils to raise revenues to meet greater service delivery demands as well as finance the maintenance of infrastructure assets so that they remain in a satisfactory condition.

There are some noteworthy findings that were *not* found to be significant in the results. For instance, the urban versus rural council classification did not yield any statistically significant findings in the model. This is despite a widely held belief

Table 5

COMPARISON OF FINANCIAL PERFORMANCE OF URBAN VS RURAL COUNCILS

Financial variables		*N*	*M*	*SD*	Std error mean
Current ratio	Rural	259	2.5978	1.64	.10
	Urban	65	2.4572	1.09	.13
Capital expenditure ratio	Rural	259	.3676	11.59	.72
	Urban	65	.9602	1.28	.15
Debt ratio	Rural	259	6.06***	5.02	.31
	Urban	65	3.52	3.24	.40
Cash flow operations to total assets	Rural	221	3.91*	6.72	.45
	Urban	50	2.27	3.08	.43
Ordinary revenue to total assets	Rural	239	16.80*	42.67	2.76
	Urban	59	7.98	4.60	.60
Ordinary revenue (less waste and sewerage charges) to total asset	Rural	239	13.47*	38.46	2.48
	Urban	59	7.20	4.09	.53
Cash resources to total assets	Rural	238	3.43*	6.02	.39
	Urban	60	1.877	2.11	.27
Cash flow cover	Rural	98	54.93	38.01	38.85
	Urban	21	53.17	181.58	39.94
Rates to ordinary revenue	Rural	259	37.06***	10.83	.67
	Urban	65	57.73	8.24	1.02
Gross debt to operating cash flow	Rural	221	1.60	5.91	.39
	Urban	50	1.23	2.66	.37
Operating cash flow to total infrastructure assets	Rural	105	5.2794	7.15	.69
	Urban	26	5.2142	4.49	.88
Ordinary revenue (less water and sewerage charges) to total infrastructure assets	Rural	121	17.6852*	31.91	2.90
	Urban	33	85.6761	375.58	65.38
Operating cash flow to revenues	Rural	221	.3545*	.16	.01078
	Urban	50	.2614	.19	.02816
Net surplus to total assets	Rural	239	.4290	5.38	.34833
	Urban	59	.6366	1.13	.14819
Total costs to bring local council infrastructure assets into satisfactory condition scaled by total revenues (net of waste and sewerage charges)	Rural	121	144.8476	166.62048	15.14732
	Urban	33	114.7209	116.03305	20.19876

* Significant at .05 level, ** significant at .01 level, *** significant at .001 level.

that Australian rural councils are experiencing a relatively higher degree of distress, partly because they are required to service larger geographical areas coupled with smaller population sizes to generate rates revenue (as pointed out earlier, many council mergers and amalgamations in recent years have involved smaller rural councils). Table 5 provides a finer analysis of the financial performance of urban versus rural councils in N.S.W. across a wide range of financial indicators, including the current ratio, capital expenditure ratio, debt to assets, cash flow from operations, cash resources to total assets and revenue generation capacity.

Also displayed are group differences in the distress construct used in this study (the costs to get infrastructure assets into satisfactory condition). It is noteworthy that neither the distress construct nor a range of financial performance variables was found to be statistically significant between urban and rural councils. Table 5 indicates that rural councils have a significantly higher level of indebtedness relative to urban councils, however rural councils appear to have a stronger revenue base relative to total assets (irrespective of whether waste and sewerage charges are included or excluded in revenues). Furthermore, rural councils have a significantly stronger cash position and operating cash flow performance relative to urban councils; as well as a lower proportion of rates to total revenue. Other financial indicators, such as the current ratio, debt servicing capacity, net surplus to total assets and gross debt to operating cash flows, were not statistically significant between rural and urban councils.[16]

A final comment needs to be made about the robustness of the regression model reported in Table 3. Two common problems in multiple regression models are multicollinearity (a condition where the model's independent variables are highly correlated with each other) and heteroscedasticity (or unequal variance—which is a violation of the identical and independently distributed error [IID] condition which can seriously undermine the statistical power of parameter estimates). Variance inflation factors reported in Table 3 are quite low for all variables, indicating that the presence of multicollinearity among explanatory variables is unlikely to be significant in the model. Furthermore, specific tests carried out on the sampled data indicated that the *t*-values reported in Table 3 do not need to be corrected for heteroscedasticity.[17]

CONCLUSIONS

This exploratory article develops a statistical model to identify factors most closely associated with local council distress in Australia. A major objective has been to develop a pragmatic and meaningful measure of council distress that can be readily operationalized for statistical modelling purposes.

The concept of distress is linked to the basic operating objective of local government, which is to provide a basic range of services to the community. It has been suggested that fiscal stress leads to underspending on infrastructure maintenance and new capital projects. However, this article views estimates of the cost of remedying deterioration in infrastructure as a proxy for a decline in service standards—and as such is a pertinent measure of local council distress. Specifically, the dependent variable construct is specified as a continuous variable, defined as the ratio of expected total costs to bring local council infrastructure assets into satisfactory condition scaled by total revenues (net of waste and sewerage charges). This dependent variable was modelled in a multiple regression framework using a wide range of performance indicators, including variables relating to council characteristics and demographics (such as council size and population size), service delivery and infrastructure variables and a wide range of financial indicators. The results revealed that revenue generating capacity (measured by rates revenue to total ordinary revenue and ordinary revenue less waste and sewerage charges to total assets) had the strongest overall statistical impact on council distress. Road maintenance costs were also found to have a significant main effect in the model; but were also associated with a number of significant interaction effects, particularly when this variable was interacted with the area (in square kilometres) serviced by councils; whether councils are classified as urban or rural; and with the expected costs of getting road assets into satisfactory condition. Surprisingly, some variables widely believed to be associated with local council distress in Australia were not found to be significant in the results, such as the distinction between rural and urban councils (using *t*-tests, the dependent variable used in this study was not found to be statistically significant between rural and urban councils, nor were a large number of financial performance variables).

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[16] Use of non-parametric tests (i.e., Mann-Whitney *U* for independent samples) did not alter the reported results materially.

[17] A common test for heteroscedasticity is to regress the squared residuals of the model on the explanatory variables. Following this procedure, it was found that none of the explanatory variables was statistically significant, suggesting that the standard errors of the *t*-values do not require correction.

There are several advantages for a using a statistical model in evaluating local council distress, as opposed to a purely descriptive or heuristic approach (such as a ratio analysis of key variables). First, a multiple regression model allows a number of complex relationships among variables (and associated interactions) to be examined simultaneously and in terms of their *joint* contribution to explaining variation in local council distress. Parameter estimates represent the statistical 'weights' calibrated to the relative contribution or strength of each variable to the distress outcome. Second, statistical models provide a formal basis for assessing the significance of each variable's explanatory power in the overall model system, and for accepting or rejecting the importance of different variables in model estimation.

Finally, statistical models, once estimated, are relatively efficient and easy to apply in practice, particularly to large samples. A major benefit of a statistically grounded distress model is that it can be used as an effective screening device across a large number of councils to identify emerging financial difficulties and pressures among councils. Such models can also have important policy applications, such as providing an objective basis for assessing the financial circumstances of local councils in various rate-pegging applications and/or in identifying distressed councils susceptible to merger and/or amalgamation activity (as well assessing whether the merger activity itself has been effective in reducing distress). Possibly triangulation of different distress measurement techniques (such as heuristic/descriptive and quantitative tests) may provide greater insights into the circumstances of public sector agencies than the use of one approach in isolation.

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APPENDIX

DEFINITION OF EXPLANATORY VARIABLES

Variable	Description
Council characteristics	
Ccode	Council and year code
Group	N.S.W. Department of Local Government council group number
Exist	Dummy variable describing whether council existed in a certain year
Urban	Dummy variable describing whether council is urban or rural
Large	Dummy variable describing whether council is large/extra large or small/medium based on the DLG's classification
Popn	Estimated resident population within council boundaries
Area	Area (sq. km) at 30 June 2001
Norrp	Number of rateable residential properties
Norfp	Number of rateable farmland properties
Norbp	Number of rateable business properties
Staff	Number of equivalent full time council staff
Local service delivery variables	
Dwpickup	Number of services (domestic waste pickups per week)
Wmsprop	Number of residential properties receiving waste management service
Recyc	Total kilograms of recyclables collected
Wastekg	Total kilograms of domestic waste collected
Infrastructure variables	
Cbldg	Carrying value of buildings infrastructure
Cvroad	Carrying value of roads infrastructure
Cvwatr	Carrying value of water infrastructure
Cvsewr	Carrying value of sewerage infrastructure
Cvdrn	Carrying value of drainage infrastructure
Cvtot	Total carrying value of infrastructure assets
Satbldg	Cost to bring buildings infrastructure to a satisfactory condition
Satroad	Cost to bring roads infrastructure to a satisfactory condition
Satwatr	Cost to bring water infrastructure to a satisfactory condition
Satsewr	Cost to bring sewerage infrastructure to a satisfactory condition
Satdrn	Cost to bring drainage infrastructure to a satisfactory condition
Sattot	Total cost to bring infrastructure assets to a satisfactory condition
Pmbldg	Program maintenance expenditure for buildings infrastructure
Pmroad	Program maintenance expenditure for roads infrastructure
Pmwatr	Program maintenance expenditure for water infrastructure
Pmsewr	Program maintenance expenditure for sewerage infrastructure
Pmdran	Program maintenance expenditure for drainage infrastructure
Pmtot	Total program maintenance expenditure for infrastructure assets.

Variable	Description
Financial Variables	
Ordrev	Total ordinary revenue (including water and sewerage charges)
Ornows	Total ordinary revenue (excluding water and sewerage charges)
Raterev	Rates revenue (ordinary and special) and annual charges
Rrrev	Residential rates revenue
Frrev	Farmland rates revenue
Brrev	Business rates revenue
Racucf	Rates and annual charges plus user charges and fees
Dwmchg	Total domestic waste management charges
Ratesout	Outstanding rates and annual charges plus user charges and fees
Ordexp	Total ordinary expenditure
Oenows	Total ordinary expenses (excluding water and sewerage)
Wsopcost	Water supply operating costs including depreciation
Ssopcost	Sewerage service operating costs including depreciation
Depn	Depreciation
Borrcost	Borrowing costs
Ndscost	Net debt service cost
Debtrat	Debt service ratio (Ndscost/revenue from ordinary activities)
Empcost	Employee costs
Ta	Total assets
Cash	Cash assets
Ca	Current assets (less external restrictions)
Cl	Current liabilities (less specific purpose liabilities)
Invsec	Investment securities
Cibl	Current interest bearing liabilities
Ncibl	Non-current interest bearing liabilities
Cfo	Cash from operating activities
Netopta	Net operating cash flow by total assets
Netoptr	Net operating cash flow by sales revenue
Cpta	Cash, deposits and marketable securities by total assets
Cpcl	Cash, deposits and marketable securities by current liabilities
Debtta	Total debt to total assets
Tlta	Total liabilities to total assets
Roa	Net income (surplus) to total assets
Current	Current assets by current liabilities
Workcta	Working capital (current assets—current liabilities) by total assets
Nicover	Net income (surplus) by annual interest payments
Cdebtc	Total debt by gross operating cash flow
Cfcover	Net operating cash flow by annual interest payments

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ROSS WOODWARD

Discussion of Jones and Walker

Australia operates under a federal system of government where the constitution places federal and state governments roughly on equal terms but with distinctly different functions. Local government is wholly the responsibility of the states, although the Australian Federal government (AG) provides some funding for local government. In New South Wales (N.S.W.), the Department of Local Government (DLG) is responsible for administering the local government system under the *Local Government Act 1993* (N.S.W.).

Financial sustainability is a significant issue, with many local councils struggling to maintain services and infrastructure within available resources. The vision of the DLG is to foster a strong and sustainable local government sector that meets changing community needs.

The DLG performs a monitoring role on the health of local council finances to ensure that appropriate management strategies are in place to maximize councils' ability to be financially sustainable. The ability to identify confidently and quickly councils in distress is important if the DLG is to be able to work efficiently and proactively to assist councils which may be struggling to provide and maintain the services expected by the communities they serve.

The paper by Jones and Walker, which addresses financial distress indicators, is therefore a welcome addition to the debate.

This discussion is written from a practitioner's viewpoint rather than an academic perspective. It is important to make this distinction at the outset because these comments relate to the realistic applicability of the model to the N.S.W. local government sector. This discussion will first provide a context for the paper by giving an overview of local government in N.S.W.

CHARACTERISTICS OF LOCAL GOVERNMENT IN N.S.W.

Council Characteristics

As at 2007 there are 152 general purpose councils in N.S.W., ranging in geographic size from 6 square kilometres to 53,510 square kilometres. Population size within local council areas range from 1,400 residents to 280,000 residents. Population density varies from 0.11 per square kilometre to 6,697.85 per square kilometre.

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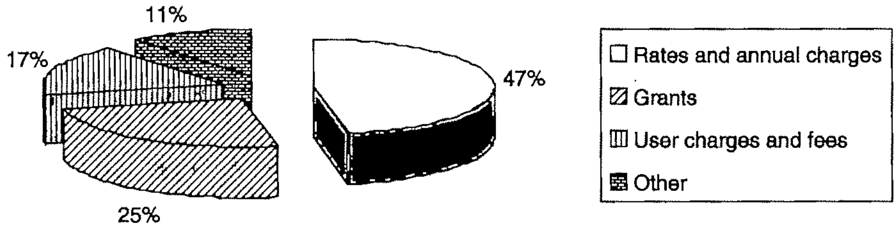
FIGURE 1

LOCAL GOVERNMENT—MAJOR SOURCES OF FUNDING



Council Services

As well as maintaining roads and collecting waste, local councils are all engaged in administering planning, building and development controls. In addition to these activities, many N.S.W. councils provide services for their communities that include libraries, recreation and sporting facilities, water and sewerage services, art and cultural, health and community services.

The type and level of services provided by individual councils varies council to council. This variation can be attributed to a diversity of factors such as the geographic area in which the council is located, population size and density, population demographics, size of council income, nature of industries occurring in the area and availability of services and infrastructure provided by other agencies, etc.

Council Finances

Local councils are as diverse financially as they are geographically and in the services they provide. Local government in N.S.W. is a $6 billion industry (DLG, 2006).

As illustrated in Figure 1, based on 2005/06 financial data collected by the DLG, local councils in N.S.W. obtain their revenue from four main sources:

1. Rates on property;
2. Financial assistant grants from the AG;
3. Council fees (such as development application fees, plant hire charges, sporting field use etc); and
4. Miscellaneous revenue (interest from investment, etc.).

This broad diversity of the characteristics of local councils make comparisons between them difficult and the identification and measurement of common metrics that can be utilized to measure and monitor council financial status challenging.

ROLE OF THE NEW SOUTH WALES DEPARTMENT OF LOCAL GOVERNMENT

The DLG performs a monitoring role on the health of local council finances to ensure that appropriate management strategies are in place to maximize councils' ability to function financially. The DLG generally monitors the total financial health of a council but does not review the component parts or changes to service levels. Currently the DLG uses a risk analysis model to review the financial status of councils. Key financial indicators utilized in the risk analysis include:

1. Operating results,
2. Liquidity and cash position,
3. Debt leverage,
4. Debt collection,
5. Employee leave, and
6. Asset management and infrastructure (the estimated funding gap).

The DLG conducts a desktop review of local councils' financial health using these metrics. If this review indicates that a council may be experiencing financial distress a closer more detailed review is undertaken to substantiate the position of the council. This determines if the DLG should continue to monitor the financial position of the council on an ongoing basis to assist it to take corrective action to avert the possibility of the council being unable to maintain appropriate service levels to the community.

The DLG no longer maintains a published council 'watch list', referred to by Jones and Walker in support of their argument. It was felt that the list could be misleading because it included all councils subject to review, from a relatively minor issue noted by external auditors to more serious concerns. Also, the existence of a published list implied that it was only those councils on the list that were being monitored during the year, when in fact the DLG keeps a watching brief over all councils.

PROGRAMS, GAPS AND INITIATIVES

Programs

As alluded to by Jones and Walker, in N.S.W. there are restrictions under the *Local Government Act 1993* on the annual amount by which councils are permitted to increase their general income and levels of domestic waste management services charges. This is commonly referred to as the rate pegging system.

Rate pegging is applied to the notional general rate income of the council, not to the rates on individual parcels of land. The annual rate peg approved by the state government allows councils a moderate increase in income broadly in line with increases in the Consumer Price Index to meet essential service requirements.

In 2004, legislation was passed (s. 508A of the *Local Government Act*) enabling councils to apply for a special variation to increase its general income by more than the pegged amount for a period of up to seven years. This has effectively given councils greater flexibility in generating enough income to implement a comprehensive long-term program of improvement for their community. Approval for a special variation is granted on the basis that the council can demonstrate that it has made significant progress in both planning and operational performance, policy development and benchmarking activities.

Local councils also receive financial assistance from the Australian government under the Financial Assistance Grants program, which has been in place since 1974–75. The grants are currently provided under the *Local Government (Financial Assistance) Act 1995*.

The grants have the following components:

- A general purpose component which is distributed between the states and territories according to population (i.e., on a per capita basis).
- An identified local road component which is distributed between the states and territories according to fixed historical shares.

Both components of the grants are untied, allowing councils to spend the grants in accordance with local priorities. Currently these grants account for approximately 16 per cent of revenue for local government in N.S.W.

In November 2000, the Roads to Recovery program was introduced as a single intervention by the AG to address the specific problem of local roads reaching the end of their economic life, and their replacement being beyond the capacity of local government. The AG provided the first tranche of funding to local councils in March 2001. N.S.W. local councils were allocated $340,000,000 from 2000–01 to 2004–05, with a further $340,000,000 allocated for 2005–06 to 2008–09 with supplementary funding of $85,000,000 in 2005–06 and $85,000,000 in 2006–07.

Gaps

There are currently a number of gaps in the N.S.W. local government financial distress indicators system. Reviews of local councils undertaken by the DLG reveal that the approach taken by individual councils to asset planning and management is highly variable. Currently there is no legislative requirement for councils to prepare an asset management plan or a long-term financial plan.

In 2006, the N.S.W. Local Government and Shires Associations (LGSA) commissioned an independent Inquiry into the Financial Sustainability of N.S.W. Local Government. Professor Percy Allan conducted the inquiry (Allan, 2006). It found that only 20 per cent of councils have adopted asset management plans, 30 per cent are proposing to prepare asset plans and 50 per cent have no intention of preparing such plans.

Service levels have not been determined in a consistent way across the sector. Financial reporting and planning is generally not well integrated with service level outcomes. Finally, there are limited benchmarks across the sector by which councils can be compared and judged.

Initiatives

There are, however, a number of initiatives currently under way to address these gaps, and it is in this context that the paper by Jones and Walker is of relevance and a valuable contribution. The DLG conducts Promoting Better Practice Reviews of councils. These reviews act as a health check for councils across a range of governance and performance indicators to ensure councils are operating at a satisfactory level. They highlight gaps and inadequacies in council operations and proactively address financial distress in councils.

In order to improve planning outcomes, a new model of integrated planning and reporting is being proposed by the DLG. This will require councils to develop long-term and adequately funded asset management/infrastructure programs as part of a Community Strategic Plan. The data, definitions and criteria are proposed to be consistent across councils.

A nationally consistent approach to asset management, financial reporting and sustainability is being developed across the states and territories of Australia. This will standardize definitions on distress indicators and ensure a consistent methodology is applied to all councils, particularly in regard to infrastructure condition and funding.

It is anticipated that the implementation of these initiatives will place councils in a stronger and more sustainable position and provide them with reliable data and information that will assist them manage and allocate their resources.

It should also provide the DLG and the communities served by the councils with more reliable and consistent data that can be utilized to assess council performance and measure and monitor council financial health.

COMMENTS ON THE PAPER

Jones and Walker have defined distress in terms of 'an inability of local governments to provide services at pre-existing levels'. The paper then uses estimates developed by local governments 'of the cost of restoring infrastructure to a satisfactory condition as a measure of degrees of "distress"'. To control for size differences between local councils the authors have scaled the data using total revenue. Scaling is necessary as councils of different sizes clearly have different capacities to afford the cost of restoring infrastructure. While the principle of this definition has merit and the idea of having a practical statistical model that could be used to identify councils that may be experiencing financial difficulty is attractive, the following matters must be considered when assessing its validity

Underlying Assumptions

The basic assumption underlying the definition of distress utilized by Jones and Walker is that a high cost of infrastructure restoration means that the council is financially unable to afford this cost and/or has insufficient revenue to be able to satisfactorily maintain its current level of services.

This assumption can be challenged on the following bases:

- Lack of definition for determining if assets are in a 'satisfactory condition'—the authors identify this as a limitation of their model. Estimation of a satisfactory asset condition could be set too high and/or too low. If the benchmark is too low then 'distress' could be masked. Conversely, if it is too high then 'distress' could be identified when it is in fact absent. Also the cost of restoration can be incorrectly estimated. It could be inflated which would incorrectly indicate distress, or it could be deflated which would mask distress. Thus the measure of distress could be subject to error both in estimate of 'satisfactory condition' and in estimating the cost of restoring assets to a satisfactory condition.

This is discussed more below when considering the reliability of the data utilized in the model.

- The definition presupposes that in the past councils have delivered an adequate level of service. However, it is possible that some councils deliver few services and have few assets. If this is the case the restoration gap could be low, indicating perhaps incorrectly that the council is not distressed.
- Changes in council policies, such as decisions to undertake new significant infrastructure projects, the sale of assets, changes to infrastructure maintenance methods, outsourcing, collaborative arrangements with other councils could also inflate and deflate asset restoration costs. Decisions such as these could affect the distress measure proposed by Jones and Walker.

Walker and Jones (2006) previously identified that a model proposed by Murray and Dollery (2005) carried with it the risk of Type I and Type II errors, that is of not listing some councils as being 'at risk' when they should have been so listed and wrongly identifying some councils at risk when in fact they were not so. While the Walker and Jones model utilizes a continuous variable (reflecting degrees of distress rather than a binary classification of 'distressed' or 'not distressed') there remains a risk that their model may suggest an inappropriate level of distress. But, of course, whatever model or form of analysis is used in these exercises, the actual outcomes depend on what councils do to extricate themselves from those situations.

Reliability of the Data

Jones and Walker recognize that a potential limitation to the dependent variable used in their model is that 'in the absence of a standard methodology for defining and measuring "satisfactory condition", local councils may have widely different interpretations of that concept and use differing estimation methods'. It is evident from their paper that considerable efforts have been made to verify the data used in the model and investigate inconsistencies and anomalies. However, the real question mark over the findings relates to the fact that there is limited confidence in the data which are inputted by councils.

Section 8 of the *Local Government Act 1993* specifies that councils are to have regard for long term and accumulative effects of their decisions and are to bear in mind that the council is the custodian and trustee of public assets and must effectively account for and manage the assets for which it is responsible. Councils must prepare their annual financial reports in accordance with the requirements of the *Local Government Act 1993* and the Local Government Code of Accounting Practice and Financial Reporting and asset accounting manual.

Section 428 2(d) of the *Local Government Act* requires councils to report on the condition of the public works under the control of the council as at the end of that year, together with:

1. An estimate (at current values) of the amount of money required to bring the works up to a satisfactory standard;

2. An estimate (at current values) of the annual expense of maintaining the works at that standard; and
3. The Council's program of maintenance for that year in respect of the works.

Councils' reporting obligations arising out of s. 428 2(d) are addressed through the completion of a schedule to the annual financial statements referred to as Special Schedule 7. This Schedule reports on the condition of public works and the extent to which councils are able to maintain those public assets.

Jones and Walker have relied on the data provided by the councils under Special Schedule 7. The problem with relying on these data is that there is limited consistency between councils on how Special Schedule 7 is filled out. As a result there are variations in interpretation of the condition assessment. For instance, there is no definition of pre-existing levels or of satisfactory 'asset performance'. Councils prepare the data from a variety of viewpoints and the collective data cannot be relied upon as an accurate assessment of any individual council's infrastructure funding need and the resultant financial distress of that particular council.

Findings from the LGSA inquiry (Allan, 2006) confirmed that infrastructure accounting and reporting requirements are interpreted differently between councils. Inadequate practices exist in the maintenance of fixed asset registers, the calculations used to estimate the cost of bringing the asset to a satisfactory condition, the methodology used for estimating useful asset life and inconsistent approaches to identifying the component parts of infrastructure assets (e.g., roads, water, etc.). Jones and Walker have relied on these data and, despite checking and cross-referencing the information from a variety of councils, the DLG cannot verify that the information is accurate.

Another factor which could affect the reliability of the data is the shortness of the time period over which the data were collected. Only data from 2001 and 2002 were used in the analysis. The shortness of the time period exposes the data to the possibility that they could be skewed by events such as natural disasters (e.g., flood or bushfire), which can cause large scale damage to roads and buildings and thus inflate the costs required to restore assets to pre-existing levels. Furthermore since this time a number of initiatives have been introduced—for example, special rate variations and the Roads to Recovery program—which have made an impact on council finances and asset maintenance.

Validity of Conclusions

The Jones and Walker model proposes that the factors which have the strongest overall statistical impact on council distress include:

- 'Revenue generating capacity (measured by rates revenue to total ordinary revenue and ordinary revenue less waste and sewerage charges to total assets)'; and
- Road maintenance costs—higher road program costs were associated with higher council distress.

Jones and Walker comment that the correlation of distress with revenue generating capacity could be related to rate pegging 'which can restrict the capacity of some councils to raise revenues to meet greater service delivery demands as well as finance the maintenance of infrastructure assets so that they remain in a satisfactory condition'. It should be noted that the data used by Jones and Walker were collected in 2001 and 2002 and since that time (2004) the *Local Government Act* has been amended to allow councils to apply for special variations to increase their general income by more than the general variation for a period of up to seven years to allow councils to undertake long term planned projects (see above). Accordingly this comment now requires reconsideration.

The impact of the cost of road maintenance on local councils has been recognized with the introduction of the AG's Roads to Recovery program in November 2000. This program is ongoing, with funding allocated until 2009.

Given the timing of the program, it is unlikely that the impact this funding might have on the dependent variable and data used by Jones and Walker would be evident in their study. It serves, however, to highlight the difficulty of developing a static model to identify council distress in an environment of ongoing reform and proactive actions of all tiers of government to foster a sustainable local government sector.

Other factors found by Jones and Walker to be of statistical significance include:

- Distress is positively associated with population size. As the largest councils in terms of population size are classified as urban it was interesting that the results showed that there were no statistically significant findings in relation to the urban versus rural council classification. Furthermore this finding does not appear to be supported by other financial indicators such as operating cash flow and revenue generation capacity that were found by Jones and Walker to be relatively stronger for larger urban councils. It also does not accord with DLG experience.
- Councils with lower staff numbers are relatively more distressed. Jones and Walker provided no commentary on this finding. On the face of it one would expect that lower staff numbers would be associated with smaller councils, which would seem to contradict the finding of distress being associated with population size and council size. This requires further investigation.
- Councils with lower carrying values for infrastructure assets were associated with greater distress. It was suggested that this could indicate that the assets are older and possibly in poorer condition.

What is evident from the findings is that if the model is valid there is no clear set of characteristics which can be used to identify councils in distress. This is not unexpected, given the diverse nature of local councils across N.S.W.

THE PAPER ADDING VALUE

The paper by Jones and Walker contributes to the development of a more robust system of asset management and financial reporting in New South Wales. The paper highlights the fact that distress indicators are currently limited and single dimensional.

The authors' definition of distress as an inability to provide services to pre-existing levels is a valuable contribution to the quest to develop mechanisms by which it is possible to identify councils experiencing financial distress.

While some of the findings do not accord with DLG experience (e.g., DLG has not in practice found larger councils to be more financially distressed than smaller councils) and in some instances seem to be conflicting and contradictory, in a number of key areas, they highlight areas already identified as those where local councils need assistance (e.g., roads and revenue).

This suggests that the model could be a valuable contribution to assist in the identification of councils in distress, but that further investigation and refinement is required. In particular it would be valuable to rerun the analysis using current data that are more accurate and consistent and reflect the impact of recent initiatives such as special rate variations and Roads to Recovery. This will be particularly relevant once the current initiatives relating to asset management have been implemented.

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EDITORIAL

The Council of The Accounting Foundation of The University of Sydney (owners of *Abacus*) wishes to announce a changed set of editorial arrangements. From the first issue of 2008, for a transitional period yet to be announced, the journal will be managed by two co-editors, Graeme Dean and Stewart Jones. In the early part of 2008 further changes are envisaged to the editorial board structure which will involve the use of associate editors who will have responsibilities for different research fields or specialties in the accounting discipline. These announcements will be more fully described on the *Abacus* Blackwell website in forthcoming months. These changes coincide with the positive announcements recently of *Abacus* regaining ISI listing, the move to four issues per annum and the announcement of the US$10,000 Annual Manuscript Award.

Another major editorial initiative is that from late in 2007 the journal will process article submissions on a fully electronic basis, using the well-known OneScholar™ web delivery technology. The move to a fully electronic mode of delivery is expected to create numerous efficiencies in the journal submission process for all parties concerned, including the editors and associate editors, authors submitting articles for review and the journal reviewers. As announced in the March issue, 2007 marks the first year in which the 'decision usefulness' criterion will underpin the *Abacus* US$10,000 Annual Manuscript Award. All papers published in the 2007 calendar year are eligible for the award. The first recipient will be announced in the first half of 2008.

The journal continues to be an outlet for quality research that facilitates academic leadership in accounting and practice. The recent audited figures show that *Abacus* reaches hard-copy subscribers in more than thirty countries with a circulation of over 2,700; with an additional 1,500 individual libraries internationally having access through licensed databases. In 2007 it is estimated that over 85,000 *Abacus* full articles will be downloaded online from the Blackwell Synergy search engine.

The last issue for 2007 has four articles. To balance some recent issues which have had a preponderance of empirical studies, this issue covers a wide range of accounting issues, namely evaluating regulatory and standards setting agencies' activities in the private and public sector, modelling ethical decision making for accountants and evaluating arguments related to clean surplus proposals.

Brief's research note examines very topical issues related to accounting valuation models, namely the residual income valuation (RIV) model which Penman (2005, p. 367) described as the 'centerpiece of accounting based valuation' and the abnormal earnings growth (AEG) model described by Penman as a model gaining increased attention. Brief emphasizes basic aspects of the model, using in his words 'algebraic detail' so as to provide greater appreciation of them and their use in valuation. He concludes that while the AEG model is gaining attention it is the more complex regarding its mechanics and interpretation.

Brown and Tarca review the activities of two quite different types of national enforcement body, the U.K.'s Financial Reporting Review Panel (FRRP) and the Australian Securities and Investment Commission (ASIC). A major feature is the provision of hitherto unavailable material about their activities over the period 1998–2004. Their article considers the enforcement, political and relevance aspects of those bodies' activities. Cases undertaken by the agencies reveal approximately half were related to recognition and measurement issues, where interpretation can be crucial. The evidence shows that while there is potential for cross-country differences to arise, they may be mitigated by the participation of both bodies in international enforcement coordination activities.

Ryan, Guthrie and Day examine the political processes surrounding public sector accounting standard setting, in particular, the Australian decision to adopt 'sector-neutral' International Financial Reporting Standards. They contend there is a need to consider the history of private and public sector involvement in the accounting standard setting process, coupled to an understanding of regulatory theory, to comprehend contemporary developments. The article concludes by arguing that, given this continued neglect by standard setters, if public sector financial reporting standards are to remain relevant to the public sector, then it may be necessary for public sector regulators to set their own standards.

Flanagan and Clarke argue that most accountants do not realize—until it is perhaps too late—that virtually all aspects of their work have an ethical dimension. They often lack the knowledge and skills to analyse issues effectively, and when confronted with conflicting ethical problems cannot choose a way to move forward that is consistent with their own values and/or the profession's code of professional conduct. They propose that the accounting profession worldwide has simply attempted to prescribe simplistic solutions to what are often complex ethical problems. The alternative approach is based on the process of 'ethical knowing'; it turns the acquisition of understanding away from a focus on the external world of rules, concepts and exemplars, to the interior world of how accountants, as people, arrive at an understanding that is consistently ethical.

All articles in this issue are pertinent to current developments affecting accounting thought and practice, especially as the move further toward a converged international financial reporting system gathers pace.

Graeme Dean,
The University of Sydney,
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RICHARD P. BRIEF

Accounting Valuation Models: A Short Primer

This note discusses basic issues related to residual income valuation (RIV) and abnormal earnings growth (AEG) models but has only scratched the surface of a complex subject. What clearly emerges from this 'primer' is the conclusion that AEG is a more complex valuation model than RIV. This complexity concerns both the mechanics and interpretation of AEG compared to RIV. Furthermore, a study by Penman (2005) raises a question about the usefulness of AEG compared to RIV. His comparisons between RIV and AEG are rather remarkable and suggest that RIV gives estimates of value which are more accurate and less variable than estimates based on AEG. Clearly, these results need further study.

Key words: Abnormal earnings growth; Accounting valuation models; Residual income valuation.

Penman (2005, p. 367) called the residual income valuation model (RIV) the 'centerpiece' of accounting-based valuation but he also acknowledged the increased attention being given to the abnormal earnings growth model (AEG). Other work has led to the further development of AEG by Easton (2004), Ohlson and Juettner-Nauroth (hereafter OJ, 2005) and by Ohlson and Gao (hereafter OG, 2006).

This note reviews some of the basic features of RIV and AEG, discusses questions concerning terminology and derives and interprets equivalent forms of these models. Emphasizing these basic issues and working through the algebraic detail should lead to a greater appreciation of these models and their use in the valuation process.

In addition, we relate this discussion to Penman's (2005) recent work which compares estimates of a firm's value based on RIV and on AEG with a firm's share price—in a sense, the accuracy of the valuation process. The results of Penman's empirical analysis are surprising because, first, estimates of a firm's value based on RIV appear to be much more accurate than the estimates based on AEG and, second, estimates based on AEG are much more variable than the estimates based on RIV.

The first part deals with OJ's derivation of AEG and RIV and then interprets the concept of abnormal earnings growth and other growth measures related to AEG. We also derive AEG directly from RIV.

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In order to apply AEG and RIV, forecasts based on constant growth assumptions are required. We present the standard formulations for the parameterized versions of AEG and RIV and then discuss equivalent forms for AEG. Finally, we discuss Penman's empirical work and estimate of standard deviation for each of the distributions of value-to-price ratios, one based on AEG and the other based on RIV.

DERIVATION OF AEG BY OJ

AEG was derived by OJ (2005) from a zero-sum equality that initially puts aside accounting and economic considerations. For this reason, Penman (2005, p. 372) asked, 'Where's the accounting?'

The core of the derivation of AEG by OJ is a mathematical expression for an unspecified variable, y, that could be any sequence of numbers and, therefore, gives the appearance of not having any relationship to accounting models. At first glance, this appears to be a bit odd since there are no accounting or economic variables in the model (except the cost of capital). However, the mathematical model that seems to have no relationship to accounting mimics RIV and AEG and, therefore, with appropriate specification of the y-variable, and interpretation of the relationships derived from the zero-sum model, the OJ model is transformed into AEG. RIV also can be derived from the OJ model.

Let

p_0 = price of equity at date zero,
x_t = expected earnings for period t,
d_t = expected dividends at date t, net of capital contributions,
$R = 1 + r$ where r is the cost of capital,
b_t = expected book value at date t, and
$x_t^a = x_t - rb_t$ = expected residual or abnormal earnings for period t.

Also, let $y_t = 0, 1, 2, \ldots \infty$, be any sequence of numbers. y_t is assumed to be governed by the following zero-sum relationship.

$$0 = y_0 + \sum_{t=1}^{\infty}(y_t - Ry_{t-1})R^{-t}. \tag{1}$$

If the terms in (1) are summed up to any period T, all terms in the summation except the last term sum to zero. The term for the end or terminal value in period T, which is $y_T R^{-T}$, does not vanish unless a further assumption is made. Thus, if $T=1$, the sum is $y_0 + (y_1 - (R)y_0)R^{-1} = y_1R^{-1}$. For $T=2$, $y_1R^{-1} + (y_2 - (R)y_1)R^{-2} = y_2R^{-2}$. And so on. Then, if $y_TR^{-T} \rightarrow 0$ as $T \rightarrow \infty$, the terminal value asymptotes to zero. This is described as the transversality condition.

Given transversality, the expression in equation (1) equals zero. The first step in giving (1) an economic interpretation is to embed the dividend discount model (DD),

$$p_0 = \sum_{t=1}^{\infty} d_t R^{-t},$$

into equation (1) by adding dividends term by term to the zero-sum expression in equation (1). The result is equation (2):

$$p_0 = y_0 + \sum_{t=1}^{\infty} (y_t + d_t - Ry_{t-1})R^{-t}. \tag{2}$$

When transversality holds (and in this note, we assume that transversality always will hold) equation (2) is equivalent to DD since all terms except those containing d_t sum to zero.[1] This property of equation (2) which zeroes out all terms except the terms containing dividends mimics RIV and AEG.

The final step in developing the basic model is to specify the variable y_t so that the resulting expression that has the same form as equation (2) can be reinterpreted in the context of an accounting valuation model, that is, a valuation model that is based on accounting numbers.

DERIVATION OF AEG FROM ZERO-SUM EQUALITY

To derive AEG from equation (2) y_t is specified as capitalized forward earning, that is,

$$y_t = \frac{x_{t+1}}{r},$$

$t = 0, 1, 2, \ldots, \infty$. Substitute capitalized earnings for y_t in (2). Then

$$p_0 = \frac{x_1}{r} + \sum_{t=1}^{\infty} \left(\frac{x_{t+1}}{r} + d_t - R\frac{x_t}{r} \right) R^{-t}.$$

After multiplying and dividing the terms in the parenthesis by r and rearranging terms,

$$p_0 = \frac{x_1}{r} + \frac{1}{r} \sum_{t=1}^{\infty} (x_{t+1} - x_t - r(x_t - d_t))R^{-t}, \tag{3}$$

where the core term in AEG, z_t, is defined as

$$z_t = x_{t+1} - x_t - r(x_t - d_t). \tag{4}$$

z_t is defined as abnormal earnings growth, giving AEG its name. Substituting z_t into equation (3) gives the basic form of AEG:

$$p_0 = \frac{x_1}{r} + \frac{1}{r} \sum_{t=1}^{\infty} z_t R^{-t}. \tag{5}$$

The derivation of (5) does not require the clean surplus relation to hold.

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[1] Transversality will not hold if dividends are always negative (a Ponzi scheme) or zero or if the payout ratio asymptotes to zero (Brief *et al.*, 2005)

DERIVATION OF RIV FROM ZERO-SUM EQUALITY

To derive RIV from equation (2) y_t is specified as b_t

$$y_t = b_t,$$

$t = 0, 1, 2, \ldots, \infty$. Then RIV is

$$p_0 = b_0 + \sum_{t=1}^{\infty}(b_t + d_t - Rb_{t-1})R^{-t} = b_0 + \sum_{t=1}^{\infty}(x_t - rb_{t-1})R^{-t}. \tag{6}$$

The derivation of (6) requires that CSR holds. $x_t - rb_{t-1}$ is residual income and gives RIV its name. The concept of residual income has a long history whereas the concept of abnormal earnings growth does not.

INTERPRETATION OF Z_t AND OTHER MEASURES OF EARNINGS GROWTH

In this section we discuss the interpretation of equivalent forms of z_t. To motivate the discussion, consider the concept of residual income, $x_t^a = x_t - rb_{t-1}$. The term, rb_{t-1}, is an estimate of an opportunity cost, that is, the cost associated with the capital invested in a business. rb_{t-1} also can be interpreted as normal or required earnings. x_t is accounting earnings. The difference, $x_t - rb_{t-1}$, has been described as excess earnings, superior earnings, residual earnings and abnormal earnings. (The last two are the most common.)

The interpretation of z_t is based on several equivalent forms of z_t. First, Easton (2004) writes z_t as $x_{t+1} + rd_t - (1 + r)x_t$ which is equivalent to the definition of abnormal earnings growth in equation (4). The first two terms are interpreted as 'cum-dividend' earnings, that is, an estimate of expected earnings in period $t + 1$ if dividends in period t had been reinvested at r. The last term, $(1 + r)x_t$, represents normal earnings or what expected earnings in period $t + 1$ would have been if x_t had been reinvested at r. Subtracting normal earnings from cum-dividends earnings leads to the interpretation of z_t as abnormal earnings growth.

To interpret z_t as defined in equation (4), start with the concept of one-period dollar growth of earnings, $\Delta x_{t+1} = x_{t+1} - x_t$, the first term of z_t. The second term in z_t, $r(x_t - d_t)$, can be viewed as an adjustment of earnings growth to take into account the earnings that could be imputed on the reinvestment of period t earnings, net of dividends. $r(x_t - d_t)$ is, therefore, regarded as normal earnings and the excess of earnings growth over normal earnings is abnormal earnings growth.

Still another interpretation is that $r(x_t - d_t)$ is required earnings on retained earnings, an estimate of opportunity cost. Then, subtracting normal or required earnings from actual earnings growth gives residual or abnormal growth of earnings. OG (2006, p. 11) explain z_t in a different way, calling it the 'earnings increment' less the adjustment for 'earnings due to earnings retained'. The difference is 'superior' or 'abnormal' dollar growth in expected earnings.

While it is customary to interpret z_t as 'abnormal earnings growth', it may not be clear to some readers whether the adjective, 'abnormal', modifies E or G. For this reason, AGE, or abnormal growth of earnings, would be the preferred interpretation of z_t. However, the acronym, AEG, not AGE, dominates in the literature.

When CSR holds, z_t has another interpretation. Since, with clean surplus,

$$(x_t - d_t) = (b_t - b_{t-1}),$$

retained earnings equals the increase in book value. Then, substituting $b_t - b_{t-1}$ for $x_t - d_t$ in z_t,

$$z_t = (x_{t+1} - x_t) - r(b_t - b_{t-1}).$$

$r(b_t - b_{t-1})$ can be interpreted as normal or required earnings on the increase in book value, that is, normal return on the additional investment in period $t + 1$. Subtracting normal or required earnings from actual earnings growth, $\Delta x_{t+1} = x_{t+1} - x_t$, gives abnormal growth in earnings, AGE, which, as indicated, is referred to as AEG in the literature.

There is another equivalent form of z_t when CSR is assumed. z_t is

$$z_t = (x_{t+1} - rb_t) - (x_t - rb_{t-1})$$

or, since abnormal earnings (AE) is defined as $x_t^a = x_t - rb_{t-1}$, $z_t = x_{t+1}^a - x_t^a$ is the one period dollar growth of abnormal earnings, GAE.

OG (2006), use the accounting system for a savings account to argue that the benchmark for AGE (z_t) is zero. Since the accounting system for a savings account implicitly assumes CSR, z_t for a savings account is

$$z_t = r(b_t - b_{t-1}) - r(b_t - b_{t-1}) = (r - r)(b_t - b_{t-1}) = 0.$$

This will always be the case whenever the accounting system mimics 'economic accounting' where the cost of capital (or IRR) is the relevant rate of return so that $b_t - b_{t-1}$ is economic depreciation/appreciation. In this case, $(r - r)$ is zero because there is only one relevant rate of return. For example, if accounting and economic earnings are the same, forward capitalized earnings is capitalized economic earnings, that is, p_0.

If, on the other hand, the accounting rate of return is a_t and CSR is assumed,

$$z_t = a_t(b_t - b_{t-1}) - r(b_t - b_{t-1}) = (a_t - r)(b_t - b_{t-1}).$$

That is, z_t does not equal zero in the general case.

DERIVING AEG FROM RIV

An equivalent form of residual earnings (Brief, 2004) for period t is $(x_t - r)b_{t-1} = (x_1 - rb_0) + z_1 + z_2 + \ldots + z_{t-1}$. Then each term in RIV can be rewritten as

$b_0 = b_0$
$(x_1 - r)b_0R^{-1} = (x_1 - r)b_0R^{-1}$
$(x_2 - r)b_1R^{-2} = [(x_1 - r)b_0 + z_1]R^{-2}$
$(x_3 - r)b_2R^{-3} = [(x_1 - rb_0) + z_1 + z_2]R^{-3}$
$(x_4 - r)b_3R^{-4} = [(x_1 - r)b_0 + z_1 + z_2 + z_3]R^{4}$
etc.

Adding up the terms on the left-hand side of these equivalencies gives p_0 for RIV. Adding the terms on the right-hand side gives p_0 for AEG since
$z_1R^{-2} + (z_1 + z_2)R^{-3} + (z_1 + z_2 + z_3)R^{-4} + \dots$ equals
$r^{-1}z_1R^{-1} + (z_2)R^{-2} + (z_3)R^{-3} + \dots = r^{-1}\sum_{t=1}^{\infty} z_tR^{-t}$ and $b_0 + \frac{x_t - rb_0}{r} = \frac{x_1}{r}$. Therefore, RIV and the AEG are equivalent. Of course, since AEG and RIV can be derived from equation (2), the models must be equivalent.

PARAMETERIZING RIV AND AEG

Forecasts for RIV and AEG are based on the assumption of constant growth of the relevant variable in the model. For RIV, residual earnings is assumed to grow at a constant rate, g. Then

$$p_0 = b_0 + \frac{x_1 - rb_0}{r - g}. \tag{7}$$

Since $x_1 = a_1b_0$, equation (7) can be rewritten as

$$p_0 = b_0\left(\frac{a_1 - g}{r - g}\right).$$

The price to book ratio becomes

$$\frac{p_0}{b_0} = \left(\frac{a_1 - g}{r - g}\right).$$

The basic form of the parameterized AEG assumes g is the one-period growth rate of z_t so that equation (5) becomes

$$p_0 = \frac{x_1}{r} + \frac{1}{r}\left(\frac{z_1}{r - g}\right). \tag{8}$$

Equation (8) has many equivalent forms. Some of the equivalent forms are based on the two-period growth concept,

$$g_2 = \frac{(x_2 - x_1) + rd_1}{x_1}.$$

Starting with equation (8),

$$\begin{aligned}
p_0 &= \frac{x_1}{r} + \frac{1}{r}\left(\frac{z_1}{r-g}\right) \\
&= \frac{x_1}{r} + \frac{1}{r}\left(\frac{x_2 - x_1 + rd_t - rx_1}{r-g}\right) \\
&= \frac{x_1}{r} + \frac{x_1}{rx_1}\left(\frac{x_2 - x_1 + rd_t - rx_1}{r-g}\right) \\
&= \frac{x_1}{r} + \frac{x_1}{r}\left(\frac{x_2 - x_1 + rd_t - rx_1}{x_1(r-g)}\right) \\
&= \frac{x_1}{r}\left(1 + \frac{(x_2 - x_1)/x_1 + rd_1/x_1 - r}{r-g}\right) \\
&= \frac{x_1}{r}\left(\frac{r - g + (x_2 - x_1)/x_1 + rd_1/x_1 - r}{r-g}\right) \\
&= \frac{x_1}{r}\left(1 + \frac{g_2 - r}{r-g}\right). \\
&= \frac{x_1}{r}\left(\frac{(x_2 - x_1)/x_1 - g}{r-g}\right) + \frac{d_1}{r-g} \\
&= \frac{x_1}{r}\left(\frac{g_2 - g}{r-g}\right).
\end{aligned}$$

Note that if p_0 is divided by x_1, a definition of the price-to-earnings ratio is obtained.

Of particular interest is that the valuation formula for constant dividend growth, $d_1/(r - g)$, is embedded in these equivalencies. But constant dividend growth is not assumed or implied, even when $g = (x_2 - x_1)/x_1$ and $p_0 = d_1/(r - g)$. Compare OG (2006, p. 15).

AN EMPIRICAL STUDY COMPARING RIV AND AEG

Penman (2005) prepared a table giving the percentiles for value/price ratios by applying RIV and AEG and comparing the results to a company's share price for all U.S. traded equities over a twenty-seven-year period, from 1975 to 2002. The value/price ratio is an estimator of the accuracy of a valuation model. As with all estimators, there are conceptual issues that arise in their interpretation. There are also questions relating to bias that must be addressed.

Penman's analysis is noteworthy because the estimates based on RIV are generally more accurate (closer to 1) than estimates based on AEG. This is especially true for the top half of each of the distributions with a median of 1 for RIV and a median of 2.02 for AEG. For the 95th and 99th percentiles, the value/price ratios for RIV are about 2.7 and 5, respectively, whereas the corresponding results for AEG are 12.5 and 30.8. However, for the bottom quarter of the two distributions, the AEG ratios are generally more accurate than RIV ratios but the differences are much smaller.

Penman also studies the behaviour of the medians over six selected years and in these comparisons, the ratios for RIV are, with one exception, closer to 1 than the ratios for AEG.

In addition, the variability of the distribution for AEG is much greater than the variability of the RIV distribution. We used the interquartile range (IQR) to estimate the standard deviation of each distribution. The IQR for the RIV distribution is 1.38 – .73 = .65 with a median of 1. For AEG, the IQR is 3.93 – 1.18 = 2.75 with a median of 2.02. To estimate the standard deviation from the IQR, we assume a normal distribution and set the standard normal deviate for the 25th and 75th percentiles equal to the deviation between each of these percentiles and the mean of the distribution (which is assumed to be approximated by the median), divided by the standard deviation. For each distribution, we solved the two equations for the standard deviation, and averaged the estimates.

The estimate of the standard deviation for the distribution based on RIV was .48. For the distribution based on AEG, the estimate was 2.07, more than four times the standard deviation of RIV. This procedure biases the results in favour of the distribution that has greater skewness, that is, AEG. Therefore, the estimate of the variability for the AEG distribution understates the 'true' variability of that distribution more than the estimate of the standard deviation of the RIV distribution understates the variability of that distribution.

While there may be other explanations for these empirical results which would alter the conclusions, the initial comparisons are rather remarkable and suggest that RIV provides estimates of value which are more accurate and less variable than estimates based on AEG. Until these results are studied further, the evidence lends support to the idea that estimates of a firm's value based on RIV are more accurate than estimates based on AEG.

CONCLUSION

This note has discussed some of the basic issues related to RIV and AEG. What emerges from this 'primer' is the conclusion that AEG is a more complex valuation model than RIV and this complexity concerns both the mechanics and interpretation of AEG. Moreover, Penman's study raises questions about whether RIV provides more accurate forecasts of a firm's value than AEG and, therefore, is the preferred valuation model.

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PHILIP BROWN AND ANN TARCA

Achieving High Quality, Comparable Financial Reporting: A Review of Independent Enforcement Bodies in Australia and the United Kingdom

This article provides a review of the activities of two quite different types of national enforcement body, the U.K.'s Financial Reporting Review Panel (FRRP) and the Australian Securities and Investments Commission (ASIC). We present material (some not available elsewhere) about their activities over the period 1998–2004 and show that both types of body can fulfil an enforcement role, albeit subject to political forces. We also assess the relevance of the bodies' past activities for comparable international enforcement following the adoption of International Financial Reporting Standards (IFRS) in 2005. A review of cases reveals that for both bodies approximately half were related to recognition and measurement issues, where interpretation can be crucial. Although there is potential for cross-country differences to arise, they may be mitigated by the participation of both bodies in international enforcement coordination activities. Past activities suggest that the scope of the bodies' activities and the extent of comparability of enforcement decisions are likely to reflect political views held within the government, corporate sector and accounting profession.

Key words: Accounting standards; ASIC; Australian Securities and Investments Commission; Enforcement; Financial reporting; Financial Reporting Review Panel; FRRP; Regulation.

This article provides an overview of the activities of the Australian Securities and Investments Commission (ASIC) and the United Kingdom's Financial Reporting Review Panel (FRRP) and assesses the relevance of their features to an enforcement strategy which aims to promote consistent and comparable international

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enforcement of financial reporting requirements. From January 2005 the U.K. and Australia became part of an international network of countries where some or all financial reports are based on International Financial Reporting Standards (IFRS). Prior to adoption of IFRS, ASIC and the FRRP were responsible for promoting compliance with company law and national accounting standards in their respective jurisdictions. Adoption of IFRS does not change their role, but it leads to the demand for consistent and comparable enforcement decisions from bodies in different countries (CESR, 2003a).

We focus on ASIC and the FRRP to outline the history and operations of two well-known and experienced bodies, which represent different approaches to enforcement of financial reporting requirements. The basic elements of an international enforcement strategy are described and then the relevance of the past activities of ASIC and the FRRP in such a strategy is considered. The key questions addressed are as follows: What were the distinctive features of the operations of ASIC and the FRRP prior to 2005? To what extent can these features assist the bodies to contribute to comparable international enforcement following adoption of IFRS?

This study provides input to the ongoing debate about the role of independent enforcement bodies in the regulation of financial reporting. It has been suggested that independent enforcement could be carried out through different types of body (CESR, 2003b). However, there has been only limited research on the activities of enforcement bodies and different approaches to enforcement, one example being Brown and Tarca (2005). Our study extends the research by providing an overview of the operations of ASIC and the FRRP, examining their activities in the period 1998–2004 and considering the bodies' similarities and differences. The Australian data are hand-collected from various sources and provide a list of ASIC actions which is not available elsewhere. We provide evidence that the enforcement role can be carried out in a way the community considers acceptable by different types of body, thus providing support for public policy decisions to allow the use of different types of enforcement body in IFRS adopting countries.

A key area of interest in the financial community following IFRS adoption is the extent to which enforcement bodies will be able to provide consistent enforcement decisions. Analysis of the past operations of ASIC and the FRRP is used to consider this matter. While the discussion involves some speculation (because we refer to uncertain future events), it addresses a matter of relevance for financial markets. There appears to be agreement in the financial community that enforcement bodies should coordinate their decisions where appropriate. However, there has been only limited discussion about the implications of this approach for a body's activities. There is scope for further consideration, given the recognized role of enforcement bodies in promoting compliance with IFRS. Our study provides some insights about the issue of coordination, which may be of interest to market participants. Fifty-four per cent of items in ASIC cases and 44 per cent in FRRP cases in the period 1998–2004 are found to relate to recognition and measurement issues. This suggests that the type of case pursued by the bodies has the potential to generate cross-country differences in interpretation.

Overall, this article provides an analysis of the position of two very different yet respected enforcement bodies prior to widespread use of IFRS. It contributes to a better understanding of the financial reporting regulatory environment by noting the way political forces have impacted on the bodies' activities. Both bodies were found to be well placed to contribute to comparable international enforcement through their experience as national enforcement bodies and their participation in regional and international forums organized by CESR or IOSCO. In addition, the article provides relevant information and a useful benchmark for future studies investigating the operations and effectiveness of enforcement bodies in promoting IFRS compliance post-2005.

ADOPTION OF IFRS AND COMPARABLE INTERNATIONAL ENFORCEMENT

In most countries, some combination of company law and accounting standards provides the framework for financial reporting and external auditors have a key role in promoting compliance with financial reporting requirements (McLeay, 1999; Orsini *et al.*, 2004; Benston *et al.*, 2006). In addition, specific bodies are used to promote compliance in some jurisdictions. For example, FEE (2001) summarized the enforcement activities of a range of bodies, including stock exchanges, securities regulators, government departments and review panels in European countries prior to 2005. With the adoption of IFRS, the autonomy of national legislators regarding the extent to which they regulate and intervene in capital markets in relation to financial reporting has not changed. However, there is greater awareness of the need to coordinate enforcement decisions and to avoid 'regulatory arbitrage' (Brown and Tarca, 2005; Schipper, 2005).

The adoption of IFRS is changing the situation dramatically in many countries. In the European Union one aim of adoption is to improve transparency and comparability of financial reporting, thereby facilitating the development of a single capital market (EC, 2002). This led to questions about whether companies from various countries, which have different legal, financing and reporting backgrounds, would apply IFRS consistently (FEE, 2004). The impact of differences in institutional frameworks on financial reporting has been extensively documented (Nobes and Parker, 2004; Benston *et al.*, 2006). These differences could well affect the application of IFRS in practice, possibly reducing the comparability of IFRS reporting (Nobes, 2006). Following IFRS adoption, the EU's Committee of European Securities Regulators (CESR) released requirements for all member states to set up independent enforcement bodies to promote high quality, comparable financial reporting (CESR, 2003b).

The United States' market regulator, the Securities and Exchange Commission, has consistently maintained the view that high quality reporting requires not only high quality standards but also rigorous interpretation and application (SEC, 2000). According to the 'roadmap' for the removal of the SEC's U.S. GAAP reconciliation requirements,[1] consistent interpretation, application and enforcement of IFRS are a prerequisite (Nicolaisen, 2005). The SEC's view and the increasing global integration of financial markets provide further incentives for IFRS adopting countries to achieve effective independent enforcement.

ROLE OF NATIONAL ENFORCEMENT BODIES

Irrespective of IFRS adoption, enforcement remains a national matter.[2] We have selected the national enforcement bodies, ASIC and the FRRP, as notable examples of two different types of body constituting different national approaches to enforcing accounting standards. They are well-established examples, with considerable experience and years of operations. In addition, they operate in capital markets with similar institutional features, such as a common language and shared legal and financial traditions. The similarities in their operating environment provide a helpful starting point for discussion of bodies with fundamentally different structures. Both bodies can be described broadly as enforcement bodies. As such, they may be involved in monitoring of financial reports in order to achieve the goal of promoting compliance with financial reporting requirements. During the period of the study the FRRP pursued this objective without a specific monitoring program while ASIC conducted monitoring as part of a proactive surveillance program.

This section considers the first of the research questions stated above, namely, what were the distinctive features of the operations of ASIC and the FRRP prior to 2005 when IFRS were formally adopted in both countries? The history and operations of the two bodies over the period 1 July 1998 to 30 June 2004 is reviewed. This period was chosen as it begins when ASIC was formed and finishes before any press notices were issued in relation to the FRRP's proactive surveillance program. We have listed all cases for which a public announcement was made in Appendixes A (ASIC cases) and B (FRRP cases). Cases are presented in date order with details about the company, the nature of the disputed matter, the outcome and its impact on the financial statements. For convenience and to assist comparability, we adapted the natural and intuitive classification developed by Fearnley *et al.* (2000), using four categories (recognition, measurement, classification or disclosure) to classify the subject matter of enforcement cases. For example, matters relating to recognition and measurement may involve greater discretion on the part of preparers and auditors than those relating to disclosure. The amount of judgment surrounding an issue is important because it affects the ability of enforcement bodies to arrive at the same view (Nicolaisen, 2005). Matters open to a number of interpretations will be those most problematic for an enforcement strategy which seeks international comparability.

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[1] The SEC requires that non-U.S. companies listed on major exchanges in the U.S.A. provide either a full restatement or a reconciliation from national to U.S. accounting standards (U.S. GAAP). The 'roadmap' outlined plans for removal of the requirement, possibly by 2008, developed by the SEC and supported by European Commissioner for Internal Market and Services, Charlie McCreevy (IASCF, 2005).

[2] The IASB has no power to enforce its standards, nor does it seek such power. The EU has legislative power and could in theory create a pan-European regulator. However, formation of such a body is a major undertaking with practical impediments (such as different national securities laws) and political ramifications including ceding sovereignty. Thus, it was not on the political agenda leading up to the adoption of IFRS in 2005 (Devlin, 2002; Schipper, 2005).

History and Operations of ASIC

ASIC was created under the *ASIC Act* on 1 July 1998. It took over many functions from its predecessor organization the Australian Securities Commission (ASC), such as regulation of financial markets, securities, futures contracts and corporations together with new responsibilities for consumer protection in superannuation, insurance and deposit taking (ASIC, 1998). In setting up ASIC the Australian government created a statutory body with necessary powers, which was responsible for oversight of the corporate community. Like the SEC, the Australian regulator was created following financial crises and questionable accounting practices (Clarke *et al.*, 2003).

Table 1 highlights the activities, funding and staffing arrangements of ASIC. As a securities market regulator, ASIC has many functions, of which regulation of securities markets and financial reporting form only one part (Table 2). ASIC is funded by the Federal government and reports to the relevant minister. It is accountable to, and can be influenced by, the government's current political priorities. Public funding allows the appointment of permanent, full-time dedicated staff and ASIC's structure aims to provide independence from the entities being regulated.

ASIC cases are drawn from a broad range of sources including complaints by investors, companies and auditors, press comments, issues raised by the Australian Stock Exchange (ASX) and by ASIC's own surveillance programs (ASIC, 1999a). A summary of cases in Table 3 shows that ASIC carried out extensive surveillance activities over the period of study. The number of companies reviewed varied each year. For example, in 1999 180 or 15 per cent of listed companies were reviewed, compared to 2003 when all 1,225 listed companies were reviewed. The reported cases give only a partial picture of ASIC activity because we do not know in the earlier years how many cases were followed up but resolved without details being released to the public. Table 3 (second and third columns) indicates that, for the years for which ASIC has released this information (2001, 2003 and 2004), many more companies were followed up than resulted in cases. In addition, the specific source of cases is unknown; that is, the extent to which they arose from complaints, referrals or surveillance has not been revealed.

ASIC reported on a total of 42 cases in the study period. There were 18 cases in the years 1998–2002, between three and seven per year (Table 3). In 2004 ASIC reported on 17 cases, following its 2003 review of all listed companies. Following government directives and the provision of additional funding (ASIC, 2003a), ASIC conducted far more surveillance in 2003 and 2004 than in the previous two years: 1,225 and 440 cases respectively, compared to 140 and 80 cases in 2001 and 2002. Recognition and measurement were the most common type of item

TABLE 1

COMPARISON OF THE ROLE AND STRUCTURE OF ASIC AND THE FRRP (TO 31 DECEMBER 2003)

	ASIC	FRRP
Role	To enforce and regulate company and financial services laws to protect consumers, investors and creditors. The role of the Market Regulation and Policy division is to regulate markets, takeovers and financial reporting and to develop policy. ASIC regulates 1.3 million companies including more than 1,000 listed companies.	To contribute to enhancement of good financial reporting in the U.K. through enforcement of the accounting requirements of the *Companies Act 1985*, including applicable accounting standards, in the annual financial statements of public and large private companies.
Origin	Established 1 July 1997 under the ASIC Act. It continued the work of its predecessor, the Australian Securities Commission (ASC).	Began operation in 1991. Recommended by the Dearing Committee which investigated corporate failure and scandals involving poor accounting and reporting in the 1980s.
Structure	Independent government body accountable to the Treasurer of the Commonwealth Parliament.	Private sector trust. A subsidiary body of the Financial Reporting Council (FRC).
Powers	Power to: conduct investigations; gather information; commence legal proceedings; and exempt persons from compliance with legislation.	Power to seek a declaration from court that a company's accounts do not comply with the requirements of the *Companies Act 1985* and to ask for a court order requiring directors to prepare revised accounts.
Executive	Chairman, deputy chairman and one commissioner. Eight regional commissioners located in the states and territories. Seven executive directors, a general counsel, chief accountant, commission secretariat and public affairs office.	Chairman, deputy chairman and 18 members from the legal and accounting professions, industry and the public service.
Staff	1,396 employees in seven divisions; 125 staff in the Market Regulation and Policy division.	Panel members are members of the business community who serve on a part-time basis. The Panel is supported by the FRC's technical, administrative and secretarial staff (15 people at 31 December 2003)
Funding (2003)	$162.8m from the Australian government; and $9.7m from activities.	FRC £2.782m from the accounting profession and public and private sector organizations.
Operating costs (2003)	$173m.	FRRP £320,000.
Recent changes	CLERP 9 (effective 1 July 2005) extended ASIC's role and powers. It gave the right to issue infringement notices and authorized the formation of a Financial Reporting Panel.	From 2004 the FRRP took a proactive role in relation to enforcement of accounting standards in which the Financial Services Authority (FSA) plays an active part.

Sources: ASIC and FRRP Annual Reports (ASIC, 1998–2003; FRC, 2001–03)

Table 2

ENFORCEMENT BODY OBJECTIVES

ASIC

- *ASIC Act*: Requirements of s. 1(2) (ASIC, 2003, p. 12)
  - Uphold the law uniformly, effectively and quickly
  - Promote confident and informed participation by investors and consumers in the financial system
  - Make information about companies and other bodies available to the public
  - Improve the performance of the financial system and the entities within it
- ASIC Objectives (ASIC, 2003, p. 82)
  - Fight fraud and misconduct
  - Raise standards in financial services and further build our expertise
  - Make a greater impact in the boardroom and improve the financial system
  - Detect and act on early warning signs
  - Maintain optimal funding, relevance and efficiency
  - Strengthen the skill of our staff
- Market Regulation and Policy Directorate Objectives (ASIC, 2003, p. 40)
  - Make a greater impact, especially on the directors and auditors of Australia's listed public companies
  - Maintain the relevance and credibility of Australia's markets in a global context
  - Develop our role in regulating and reporting on how market operators have fulfilled their licence obligations
- Two-Year Targets (ASIC, 2003, p. 14)
  - Encourage a culture of disclosure and strengthen corporate governance
  - Increase transparency and accountability in our markets
  - Participate in and influence international accounting standard setting
- International Relations and Regional Coordination Directorate Key Issues (ASIC, 2003, p. 48)
  - Coordinate increasing requests for international investigative assistance and legal advice
  - Contribute to coordinated action and regulatory cooperation especially within the Asia Pacific region
  - Contribute to international work on audit, financial disclosure, clearing and settlement, risk assessment of managed fund operators, and simplified prospectuses for collective investment schemes
- Two-Year Targets (ASIC, 2003, p. 15)
  - Work on international standards of disclosure, audit, clearing and settlement
  - Improve international enforcement capacity

FRRP

- Carrying out its formal responsibilities on behalf of the Secretary of State in relation to annual accounts and other documents falling within its remit
- Maintaining a Panel body that includes a wide and balanced representation, at the most senior level, of businesspeople, accountants, lawyers and preparers and users of accounts such that those who come before the Panel know that they are judged by their peers in the financial reporting community
- Developing and operating a selective programme of proactive review of annual accounts and other documents falling within its remit and which is based primarily on risk assessment

TABLE 2

(CONTINUED)

FRRP
Enquiring appropriately into specific sets of published financial statements and other documents falling within its remit which come to its attention, whether through proactive review, through complaints, or otherwise
Ensuring that any published findings of the Panel concerning any case considered by it are brought to the attention of relevant regulatory bodies so that they can determine whether disciplinary or other sanctions should be applied, and to cooperate with and provide information to such regulatory bodies so far as permissible
Liaising with FSA and other enforcement agencies in the U.K. and internationally to foster consistent application of accounting requirements and generally to improve the compliance of financial information with relevant reporting requirements
Contributing to and seeking to sustain an EU approach to enforcement that, recognizing the effectiveness of the U.K. arrangement, is vigorous, effective
Seeking an appropriate level of knowledge, understanding and public recognition within the financial reporting community to maximize the Panel's deterrent effect

Source: http://www.asb.org.uk/frrp/about/aims.cfm.

reported in the cases (46 per cent and 33 per cent respectively). Disclosure items were 17 per cent and classification 4 per cent of total items (Table 3, columns 4–8). Table 3 shows that the proportion of recognition and measurement items was greater in 2003 and 2004 compared to the previous two years, suggesting a focus on recognition and measurement issues in the increased surveillance activity which occurred in the latter two years.

The financial impact of ASIC actions is shown in Table 3 (columns 9 and 10). The proportion of cases with a significant impact (defined as a change greater than 10 per cent) on earnings per share (EPS) was 67 per cent and the proportion of cases with a significant impact on shareholders' equity was 38 per cent. The size of companies (based on gross or total assets) involved in ASIC cases is shown in Table 4, which allocates cases to three groups based on relative size.[3] ASIC cases related to small (55 per cent), medium (29 per cent) and large (11 per cent) companies. The predominance of cases relating to smaller companies reflects the relatively large number of smaller companies in Australia. However, it may also imply compliance is more difficult for smaller companies, possibly because they have fewer resources to meet financial reporting requirements.

ASIC cases appear to be companies experiencing poor performance and having less robust corporate governance practices. Da Silva Rosa *et al.* (2005) found that companies involved in ASIC cases over the period 1998–2004 were less profitable and less likely to have a Big 4 auditor than companies in a matched control

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[3] Based on total assets, company size ranges from A$0.252m to A$44,261m in Australia and from £4m to £9,177.5m in the U.K. (Appendixes A and B). We convert values to U.K. pounds and allocate firms to three arbitrary size ranges (less than £100m, between £100m and £1000m, and more than £1,000m) to allow a discussion of the relative size of companies involved in cases.

TABLE 3

ASIC AND FRRP CASES, 1998–2004

Year ending 30 June	Reviewed (1)	Followed up (2)	Cases (3)	Items (4)	Disclosure (5)	%	Classification (6)	%	Recognition (7)	%	Measurement (8)	%	EPS change > 10% (9)	%	SHE change > 10% (10)	%
ASIC																
1999	180	Unknown	4	6	1	17	0	0	5	83	0	0	4	100	1	33
2000	310	Unknown	7	8	2	25	0	0	3	38	3	38	4	67	3	50
2001	140	53	4	4	4	100	0	0	0	0	0	0	0	0	0	0
2002	80	Unknown	3	3	1	33	0	0	1	33	1	33	0	0	0	0
2003	1,225	31	7	8	0	0	0	0	3	38	5	63	3	50	3	50
2004	440	30	17	17	0	0	2	12	9	53	6	35	11	73	5	33
Total			42	46	8	17	2	4	21	46	15	33	22	67	12	38
FRRP																
1999	n.a.		5	7	3	43	1	14	1	14	2	29	1	33	1	33
2000	n.a.		4	6	3	50	2	33	1	17	0	0	1	100	0	0
2001	n.a.		4	11	3	27	3	27	3	27	2	18	2	67	3	100
2002	n.a.		7	9	5	56	1	11	1	11	2	22	1	33	0	0
2003	n.a.		3	3	0	0	0	0	2	67	1	33	3	100	2	67
2004	n.a.		2	3	1	33	0	0	1	33	1	33	1	n.a.	1	n.a.
Total			25	39	15	38	7	18	9	23	8	21	9	60	7	47

This table provides details of cases reviewed, followed up and publicized by ASIC and the FRRP over the period 1998–2004. It is based on material presented in Appendixes A and B. Column 3 lists the publicized cases and column 4 shows how many separate items were noted in each case. Columns 5–8 classify items according to their subject matter. Columns 9 and 10 show the number of cases for which an item had a significant impact on earnings per share (EPS) and total shareholders' equity (SHE). n.a. = not available. Company financial statements were not available for the second FRRP case in 2004.

TABLE 4

COMPARISON OF CASES BASED ON SIZE ASIC AND FRRP, 1998–2004

Year ending 30 June	Small < 100 £ million	Medium 100–999 £ million	Large > 1,000 £ million	Not available	Total
ASIC					
1999	2	1	1		4
2000	1	3	2	1	7
2001	3	1			4
2002	1		1	1	3
2003	6	1			7
2004	10	6	1		17
Total	23	12	5	2	42
%	55	29	11	5	100
FRRP					
1999	4		1		5
2000	3	1			4
2001	3		1		4
2002	3	2	2		7
2003	2	1			3
2004			1	1	2
Total	15	4	5	1	25
%	60	16	20	4	100

Size of companies based on gross (total) assets in millions of pounds. Total assets reported for Australian cases (Appendix A) are converted at 30 June year end exchange rates.

sample. The ASIC firms were more likely to have an executive director as board chair and audit committee chair and were less likely to have an audit or remuneration committee.

History and Operations of the FRRP

The FRRP was created in 1991, following recommendations of the Dearing Committee, to provide enforcement of accounting standards and to improve the quality of information available to shareholders (FRC, 2003, p. 54). Prior to the 1990s, 'creative accounting' excesses were widely reported and auditors were under pressure to conform to the interests of preparers rather than the spirit of accounting standards (McBarnet and Whelan, 1999, pp. 4–6). The U.K. government chose a regulatory model that maintained emphasis on self-regulation in the business sector. At the time of the FRRP's creation, setting of accounting and auditing standards was controlled by the accounting profession and stock exchange listing rules were set by the London Stock Exchange (Brown and Tarca, 2005). The structure chosen for the FRRP was compatible with the existing institutional framework for financial reporting and the cultural preferences of the business community, but was markedly different from the structure of a securities regulator like the SEC.

The FRRP was given a narrower remit than ASIC—to review financial reporting matters brought to its attention—consistent with the government's aim of promoting self-regulation. The chosen legal structure has implications for the body's powers and amount and source of revenue as well as staffing arrangements (Table 1). The FRRP is funded by both private and public sector bodies as well as the accounting profession. The presence of an oversight body, the Financial Reporting Council (FRC), provides a barrier against undue influence by bodies providing funding and avoids possible problems with independence such as regulatory capture.[4] The FRRP members are drawn from the legal and accounting professions (FRC, 2003) and have practical experience useful for assessing cases brought before the Panel. This structure means directors and auditors discuss their financial reporting practices with their peers, which is a possible advantage compared to the securities regulator model. However, it can create the perception that the Panel lacks independence. In practice, Panel members serve on a part-time basis and can avoid participating in cases which would involve a potential conflict of interest.

Until 2004, the FRRP was described as a reactive body, because it acted only on cases brought to its attention. These arose from complaints made by individuals and companies and press comments (Hines *et al.*, 2001).[5] Proactive surveillance activities were commenced during the last year of the study, but there was no public announcement about any specific case before the end of the study period (30 June 2004). Thus, for most of the study period, the FRRP's actions related mainly to referred cases. The FRRP had discretion over the cases it pursued, but did not control the cases brought to it. Therefore it had limited control over the extent of matters it considered.

Appendix B provides details of FRRP cases over the period 1998–2004.[6] The number of cases resulting in press notices was relatively low (averaging four per year) compared to earlier years, for example 1993–97, when the average was seven per year (Fearnley *et al.*, 2000, p. 17). The total number of cases over the period of this study was twenty-five, giving rise to thirty-nine specific items. Disclosure items were the most common items (38 per cent). Twenty-three per cent of items related to recognition and 21 per cent to measurement. Classification items constituted 18 per cent of the total (Table 3, columns 4–8).

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[4] Regulatory capture refers to the process by which the parties to be regulated come to control the regulator (Walker, 1987).

[5] Prior to 1997 the FRRP also acted on information about qualified audit reports and other disclosed non-compliance matters received from the London Stock Exchange (Fearnley *et al.*, 2000, p. 5).

[6] Information about FRRP cases for 1997–2000 was obtained from Fearnley *et al.* (2000). Information about FRRP cases for 2000–04 was obtained from the FRRP's annual reports and press notices (which were obtained from the FRRP's website and directly from the FRRP) and from company financial statements sourced from company websites, Mergent Online and directly from companies.

The financial impact of FRRP cases is shown in Table 3 (columns 9 and 10). The proportion of cases with a significant impact on EPS was 60 per cent and the proportion of cases with a significant impact on shareholders' equity was 47 per cent. The size of companies involved in FRRP cases was small (60 per cent), medium (16 per cent) and large (20 per cent) companies. Similar to the ASIC situation, the proportions reflect the relatively large number of smaller companies under the FRRP's remit. Again similar to ASIC companies, FRRP cases appear to relate to firms experiencing financial difficulties. Peasnell *et al.* (2001) found that companies in FRRP cases were less likely to have a large auditor (Big 5), an audit committee and a high proportion of outside directors. The firms showed weak operating performance in the defect year, but not in subsequent years.

Fearnley *et al.* (2000) reported a decline in referrals and press notices over the period 1991–2000, which was interpreted by the FRC as an improvement in compliance levels.[7] McBarnet and Whelan (1999, p. 36) explored the alternative view that the decline in cases was not a positive sign. They explained that there were deterrents to whistle-blowing, which could mean that serious cases were not being pursued. Hines *et al.* (2001) presented evidence that an FRRP investigation was not considered a favourable event by either the company or its auditor, providing support for the notion that preparers and auditors were likely to improve their level of compliance to avoid an investigation. The FRRP received considerable publicity in its early years, which could have led to increasing compliance in the early years and thus fewer cases in the later years. Carol Page, secretary of the FRRP, provided an explanation for the smaller number of cases in recent years. She suggested that while the level of compliance by large companies was high, the complexity of their financial statements was a barrier to public queries, leading to fewer issues being raised with the Panel. In addition, some cases brought to the Panel related to less significant accounting issues and those without broader application in the financial community. Therefore, they were resolved without the Panel issuing a press notice.[8]

From 2004 significant changes occurred in the FRRP's operations, involving widening its remit and commencing proactive surveillance (FRC, 2005). Adoption of IASB standards in 2005 created a demand for proactive, risk-based enforcement (FEE, 2003). In 2003, the Secretary of Trade and Industry announced a number of reforms to improve corporate governance, including proactive enforcement of accounting standards (FRC, 2003). This task could have been allocated to the Financial Services Authority (FSA),[9] but the government decided to expand operations of the FRRP, clearly a vote of confidence in the Panel. A budget of twenty-one staff and £3.7m was proposed, a considerable increase from 2003 when it had approximately six full-time equivalent staff and a budget of £700,000.

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[7] We have not reported the number of referrals to the FRRP as it was not included in their annual reports from 2001 to 2003.

[8] Personal communication, April 2005.

[9] The FSA is an independent body that regulates the financial services industry in the U.K. (FSA, 2004).

Proactive monitoring commenced in 2004 with review of 226 sets of accounts. The FSA and the FRRP began to work more closely, with the FSA assisting in the identification of issues and companies to target, based on risk-based assessment models (*Accountancy*, 2003). The *Companies (Audit, Investigations and Community Enterprise) Bill* was introduced into the U.K. parliament in December 2003 and received Royal Assent in October 2004 (GNN, 2004). It extended the remit of the FRRP to cover financial information other than annual accounts, certain listed entities that are not companies and foreign companies. The Bill also gave the FRRP power to require supplementary information from issuers and their auditors (FRC, 2003). In 2005, the Panel issued draft revised operating procedures and made its first report on proactivity (FRRP, 2005a, 2005b).

Similarities and Differences—ASIC and the FRRP

The above discussion shows that there were significant differences in the structure and organization of ASIC and the FRRP. Although they shared a common objective—to promote compliance with financial reporting requirements—they differed in their approach, with ASIC making use of proactive surveillance while the FRRP until 2004 acted on cases referred to it.

From 1998 ASIC operated a targeted surveillance program which incorporated an announcement by ASIC of areas to be targeted. The aim of the announcement was twofold. First, it signalled to companies that ASIC was an active enforcement body, and second, it aimed to prompt companies to give greater attention to matters ASIC considered important. By 2004, the program featured routine surveillance of all listed companies, with each company being reviewed at least once every four years. In addition, targeted surveillance is conducted in relation to specific issues and in respect of companies considered to pose a particular risk (Pound, 2004).

Although there were some differences in how the bodies were alerted to cases, once a case was under investigation, many of the same activities occurred in each body. These included:

- review of the issue by the enforcement body;
- contacting the company and requesting information about the issue;
- discussing the issue with the company's directors and auditors;
- further consideration of the issue by the enforcement body to decide whether additional action was necessary;
- advising the company whether revision of the accounts, or some other action, was required; and
- ensuring the company complied with the enforcement body's request. (ASIC, 1999a; Fearnley *et al.*, 2000)

The activities of ASIC and the FRRP resulted in changes to companies' financial statements. Table 5 shows that for both bodies the most commonly observed remedial action is revision of the accounts in a subsequent annual report (40 per cent ASIC and 44 per cent FRRP) followed by making an announcement (or revision of a preliminary announcement) together with revision of the subsequent annual report (ASIC 17 per cent and FRRP 16 per cent). The results show that

TABLE 5

REMEDIAL ACTION ASIC AND FRRP CASES, 1998–2004

Remedial action	ASIC		FRRP	
	Cases	%	Cases	%
Issue revised accounts	5	11	1	4
Issue supplementary note/announcement	7	17	4	16
Revise interim statement and subsequent accounts	0	0	2	8
Make announcement/revise preliminary announcement and subsequent accounts	7	17	7	28
Revise subsequent accounts	21	50	11	44
None (following court case)	2	5	0	0
Total	42	100	25	100
Including: court cases	6	14		
Enforceable undertakings	4	10		

Sources: ASIC media releases; FRRP press notices. Available from http://www.asic.gov.au and http://www.frc.org.uk.

both bodies often used the remedial action that had least impact on companies. The commonly chosen remedies imply regulators saw the more dramatic and expensive action of re-issuing accounts as unnecessary, given the matter was disclosed in the press and the public informed. Revision of previous accounts is a much more substantial undertaking as it raises questions about the shareholders' past approval of the accounts and whether other matters contained in the accounts should also be revised in light of subsequent information. Issuing revised accounts occurred in one FRRP and five ASIC cases. McBarnet and Whelan (1999, p. 81) noted that the FRRP's preference for subsequent revision could be interpreted as a sign of weakness. However, they also proposed that the 'softly softly' approach was an integral part of the Panel's enforcement strategy, which makes use of voluntary compliance.

Despite their different structures, both bodies have the power to refer matters to court if necessary. The FRRP has functioned with only this 'big stick' to wave at recalcitrant reporters, and is well known for having achieved its results without having taken a company to court. However, since its inception resources have been maintained to fund a court action and the FRRP has indicated its willingness to take this path if necessary (FRC, 2002, 2003). McBarnet and Whelan (1999, pp. 55–6) argued that the possibility of being taken to court is a very real threat, and that the FRRP has an 'iron fist in a velvet glove'. The authors suggested that companies complied with the Panel's views not necessarily because they agreed with them but to avoid the costs of litigation and damage to reputation. In addition, it was noted that the FRRP itself has an incentive to avoid court action. A loss for the Panel could have adverse reputation effects and create legal precedents which assist the process of creative accounting.

ASIC has taken companies to court in four of the forty-two cases, achieving outcomes favourable to ASIC. It has itself been taken to court (by Optus and MYOB) to clarify financial reporting matters (Appendix A). ASIC has consistently maintained that it is prepared to initiate court action to enforce accounting standards (ASIC, 1999b). However, like the FRRP, court action is not the preferred course, given the lengthy delay, uncertainty and expense involved. Bird *et al.* (2003) concluded that ASIC legal actions were a 'last resort' strategy. From 1998 ASIC has had power to enter into an enforceable undertaking as an alternative to court proceedings. Enforceable undertakings are a more versatile remedy and can be used to achieve outcomes not possible through court action (ASIC, 1999b). Appendix A shows the court cases and issue of four enforceable undertakings occurred prior to July 2002. The results indicate that since this time ASIC has achieved its objectives (at least in relation to reported cases) without resorting to legal action and imply the regulator can obtain compliance with financial reporting requirements without pursuing the matter in court.

Publicity is an important deterrent in any regulator's armoury and was used by both ASIC and the FRRP. Indeed, the FRRP's 'name and shame' strategy is considered effective in the U.K. business environment as companies and auditors do not wish to attract the adverse publicity associated with an FRRP inquiry (Hines *et al.*, 2001). Companies in Australia can also be subject to considerable press coverage if investigations by ASIC are made public. ASIC has a high profile in the community because of its wide range of activities. For example, it is often mentioned in the financial press in relation to its function as regulator of financial advisers and investment schemes and when pursuing legal actions under the *Corporations Act*. The range of ASIC's activities gives it a public profile in the Australian marketplace far exceeding that of the FRRP in the U.K. For example, a review of press items in the Factiva database (formerly Dow Jones) for 2002–03 produced 21,532 articles for ASIC compared to 257 for the FRRP, a ratio of almost 85 to 1.

The objectives of the bodies refer to making an impact in the boardroom and on directors and auditors (ASIC, Table 2) and to seeking an appropriate level of knowledge, understanding and recognition in the financial reporting community (FRRP, Table 2). Publicity and communication are integral to achieving these objectives, causing both bodies to be involved in discussions with members of the business community. ASIC's chairman, its commissioners and staff are routinely involved in speaking engagements to raise community awareness of the regulator. Fearnley *et al.* (2000) assessed the impact of FRRP investigations on community interest and awareness of FRRP actions by measuring the number of press articles in relation to a press notice. They reported a distinct long-term decline in the level of reporting of FRRP cases in the period 1991–2000. We found this trend continued until 2004, with an average of 2.2 press articles per case (Table 6).[10] The majority of cases in all years of the study related to small and medium sized

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[10] Table 6 was constructed using data from Factiva for the years 2001–04. When we examined our data for the years 1999–2000 we found our results were consistent with Fearnley *et al.* (2000) for this period, indicating we were using comparable data sources.

TABLE 6

PRESS COVERAGE ASIC AND FRRP CASES, 1998–2004

Year ended 30 June	ASIC				FRRP			
	Cases	AFR	All	Articles/cases	Cases	FT	All	Articles/cases
1999	4	12	62	15.5	5	5	11	2.2
2000	7	16	59	8.4	4	1	1	0.3
2001	4	12	69	17.3	4	1	20	5.0
2002	3	23	145	48.3	7	1	16	2.3
2003	7	6	35	5.0	3	0	5	1.7
2004	17	18	116	6.8	2	0	3	1.5
Total	42	87	486	11.6	25	8	56	2.2

Source: Factiva Database. AFR = *Australian Financial Review*; FT = *Financial Times*; All = all newspapers in Australia or United Kingdom (respectively) covered by Factiva.

entities. A lack of public interest in issues relating to smaller companies may explain the low level of press coverage but it does not explain why coverage should decline.

Press coverage for ASIC averaged 11.6 articles per case (Table 6). ASIC's coverage varies over the period with the highest level (an average of forty-eight articles per case) being in 2002, when two especially high profile cases (Optus and MYOB) were in progress. Excluding these two cases, the average number of articles per case is eight.[11] The use of the media by the enforcement bodies (both make regular use of press releases) indicates that publicity has an important role in achieving the bodies' objectives. For example, it reminds market participants that the regulator is taking an active role in the marketplace. However, the level of publicity may tell us as much about the issues the media chooses to cover as the effectiveness of the regulator.

Both the FRRP and ASIC used their activities to educate the financial reporting community about their expectations. For example, in 2001 the FRRP issued a press release to remind companies about some basic issues relating to accounting for financial instruments, including their definition, as it considered financial reporting in this area was deficient (Peel, 2001). ASIC used its surveillance program as an eduction tool as well as a way to improve compliance. For example, companies were advised that ASIC's surveillance would include the so-called new economy or dot.com companies. In 2001, 140 dot.com companies were reviewed and fifty-three were required to clarify their financial reports and provide additional disclosures. This indicates that ASIC had correctly predicted weaknesses in the reporting practices of companies in this sector. The targeted surveillance had two effects: to identify companies with inappropriate accounting practices and insufficient disclosure and to prompt other companies to review their accounting procedures to ensure compliance before lodgement of their financial reports.[12] A regulator's aim of promoting voluntary compliance with accounting standards has been described as 'below the water line' influence because, although it cannot be measured, it is very real (McBarnet and Whelan, 1999, p. 11).

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[11] When the comparison is based only on coverage in the national business newspaper (the *Australian Financial Review* in Australia and *The Financial Times* in the U.K.) ASIC's coverage was 2.1 articles per case and the FRRP's 0.3 (Table 6). Therefore our conclusions are substantially unchanged after controlling for possible differences in syndication of articles among local domestic newspapers.

The expansion of ASIC's budget and financial reporting surveillance activities contrasts with relatively few changes at the FRRP over the period from 1991 to 2002. The U.K. government had the power to alter the role of the FRRP at any time, but apparently did not see sufficient reason to do so. This could have reflected satisfaction with the performance of the FRRP since 1991. In addition, it suggests continuing commitment to self-regulation by the government and business community, which emphasizes directors' responsibility for content of financial statements and the auditor's role in attesting the financial statements give a true and fair view. Some commentators have argued the FRRP has been an effective body, citing its ability to have companies change their accounts without resorting to court action and its relatively low cost (Fearnley *et al.*, 2000; Hines *et al.*, 2001). McBarnet and Whelan (1999, p. 263) concluded that the Panel was effective because of corporate concessions based on practical considerations.

A sense of the extent to which future activities of the two bodies will be more similar can be gained by considering their current objectives, which are shown in Table 2. While the objectives have different wording, they have a common focus. Both bodies are to carry out the responsibilities with which they are charged, by legislation (ASIC) or by the Secretary of State (FRRP). Both are concerned with how financial reporting is carried out, and with making an impact, in their respective jurisdictions, which will improve financial reporting and the financial system. ASIC has worked closely with the ASX in its surveillance activities. Similarly, the FRRP has a relationship with the FSA. Both ASIC and the FRRP are involved in international enforcement activities through participation in enforcement coordination forums (see below). The objectives translate into many common activities, including maintaining skilled staff/members, conducting proactive surveillance, educating market participants, and liaising with other regulatory bodies in their own country, region and internationally. Our comparison illustrates that similar objectives and activities can be carried out by enforcement bodies with different structures. Based on our analysis of ASIC and the FRRP's activities over the period 1998–2004, we will now explore how they are positioned to support internationally comparable enforcement.

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[12] The issues related to accounting for acquisitions of businesses, reporting and amortizing intangibles, accuracy of quarterly cash flow statements, and recognition of revenue. See Appendix A for details of specific cases.

COMPARABLE INTERNATIONAL ENFORCEMENT

This section addresses the second of our research questions, namely, in what ways can the features of ASIC and the FRRP assist the bodies to contribute to comparable international enforcement following adoption of IFRS? Based on the above review of their operations, the following comments are offered about these two different types of enforcement body, their role as national enforcement bodies and potential issues for comparability of international enforcement. We outline three elements of an international enforcement strategy and describe how such a strategy could affect ASIC and the FRRP subsequent to adoption of IFRS.

Political Nature of Regulation

The creation and activities of ASIC and the FRRP reflect government intervention in the financial reporting process. In that sense, the bodies' operations are consistent with theories of regulation, such as the public interest and private interest theories. Government action in creating each enforcement body and determining the scope of its activities and funding can be explained in terms of the public interest. Stated in its simplest terms, the theory suggests that the government intervenes in the public interest to protect market participants from market inefficiencies (Posner, 1974). However, such an explanation does not exclude an alternative view such as that proposed by private interest theory. In this scenario, intervention reflects vote buying by the government, in order to secure its political future (Stigler, 1971). Enforcement literature identifies two types of enforcement style, namely accommodative and sanctioning. Despite their different structures, both ASIC and the FRRP would seem to follow the former, which focuses on preventing violations by securing cooperative compliance by persuasion, negotiation, bargaining and education (Bird *et al.*, 2003).[13]

The activities of ASIC and the FRRP over the period of the study reflected the views of the government in their respective countries about the timing and extent of intervention. An example of a government-initiated change in ASIC's activities was the 2004 CLERP 9 legislation. The Federal government increased ASIC's powers and provided funding for additional surveillance of financial reporting. This activity reflected the Australian government's view on what was necessary in the current environment and allowed the Chairman of ASIC to conclude that the Australian financial reporting framework was not exposed to 'systemic weakness' (ASIC, 2003b, p. 4).[14]

Following the collapse of Enron and WorldCom in the U.S., the U.K. government in 2002 set up the Co-ordinating Group on Audit and Accounting Issues (CGAA) to a consider the effectiveness of the financial regulatory and corporate governance framework. The government recommended that the FRRP introduce an element of proactivity to its work to increase the robustness of the U.K. regulatory regime and to meet the demands for enforcement from EU securities regulators and CESR. FRC material suggests that subsequent changes to FRRP activities, specifically the introduction of proactive surveillance, are linked to the CGAA review and adoption of IFRS in the EU, rather than dissatisfaction in the U.K. with FRRP operations or effectiveness, as such (FRC, 2002, 2005).

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[13] McBarnet and Whelan (1999, p. 47) stated that the FRRP wanted its relationship with companies to be 'not confrontational and intrusive but consensual and cooperative'.

[14] Interestingly, this same expression was used by the FRRP, when reporting on the outcome of their first period of proactive surveillance activities. They stated 'the Panel found no evidence of systemic weakness in the accounts it examined' (FRC, 2006, p. 15).

The activities and operations of both ASIC and the FRRP were dependent on the mandate given them by their political masters. The scope of activities over the period of the study reflects more the will of politicians than the structure of the bodies *per se*. The development of risk-based, proactive surveillance at the FRRP since 2004 demonstrates that this function can be carried out irrespective of the type of enforcement body. The evidence presented in this article suggests that level of enforcement activity reflects the extent of the government's and business community's support for intervention in the marketplace and willingness to fund the enforcement body's operations. These factors appear to explain more of the observed activities of ASIC and the FRRP than their structure as a securities regulator or a review panel.

Measurement of Effectiveness

Measuring the effectiveness of an enforcement body is a difficult if not impossible task for the outside observer. Effectiveness should consider the extent to which the body achieves its objectives. Where these are broadly stated, they may be difficult to measure. For example, a key responsibility of ASIC is maintaining, facilitating and improving the performance of the financial system and the entities within it (*ASIC Act*, s. 1(2)). However, the outcomes associated with achieving this objective are largely unobservable by outside parties, often because the matters remain confidential. The FRRP has shown that increases in effectiveness do not necessarily equate to input measures such as more staff or a larger budget. More generally, there is a lack of information about the cases that the regulators do not pursue and the extent to which likelihood of success influences their activities.

Fearnley *et al.* (2000) addressed the question of effectiveness of the FRRP by considering various aspects of its activities over the period 1991–2000. They investigated the number of cases pursued and press notices issued; content of FRRP decisions and their impact on companies, competitors and market prices; timeliness of activities; and type of remedy achieved. In addition, they considered views of representatives of regulatory bodies, audit firms and companies subject to investigation. Overall, they made the judgment that the FRRP was an effective body, which increased compliance with financial reporting requirements in a cost effective manner that was well suited to the business environment in the U.K.

In relation to ASIC's effectiveness, a survey conducted on its behalf reported that effectiveness had improved since 1998, most strongly in the areas of ensuring adequate financial reporting and disclosure, protecting the overall integrity of Australia's capital market and in enforcing the law. Respondents said ASIC had a positive impact as a regulator on the overall market and on individuals' own organizations.[15] Parties who were actively involved with ASIC considered it had become more active and proactive, and better able to publicize its activities and enforcement success (Chantlink, 2000).[16] An example of the latter is a press report that stated 'in every showdown ASIC has won the day' (Ries, 2000). The report goes on to list thirteen investigations between 1993 and 2000 where the regulator's view prevailed and companies changed their accounts.

There are, of course, critics of both the FRRP and ASIC who argue that the bodies are not effective. The FRRP was criticized for pursuing minor matters and its effectiveness was questioned, given the diminishing number of press releases in recent years (Fearnley *et al.*, 2000). McBarnet and Whelan (1999, p. 274) concluded that an image of successful enforcement has been maintained in the U.K., although creative accounting is undoubtedly still going on. Further, they stated that the corrective action accomplished has been of a limited nature, reflecting astute policy and unavoidable tensions in the business environment. ASIC has been criticized for its lack of enforcement of the *Corporations Act*, for example by Leibler (2003), who argued it has not done enough to ensure financial reporting meets the needs of investors. He claimed action by ASIC to enforce the true and fair view requirement contained in company law was long overdue.

We are unable to conclude that one type of enforcement body yields more effective outcomes than the other. Moreover, our analysis suggests that, consistent with views expressed by CESR (2003b), the functions of an independent enforcement body can be carried out in either structure. What is important is the power and resources of the enforcement body and how they are deployed, not the body's structure *per se*. Considering their position at 2006 and experience over the previous several years, it would appear both ASIC and the FRRP are well-positioned to participate in and contribute to international activities aimed at promoting greater comparability in financial reporting.

International Enforcement Strategy

We propose that the current international enforcement strategy has three elements. These are: common standards apply in each jurisdiction; standards are applied in the same way in each jurisdiction; and national enforcement bodies promote consistent, comparable application of IFRS. We outline these elements below and consider how ASIC and the FRRP could be affected by such a strategy.

1. Common Standards Apply in Each Jurisdiction From 2005 IFRS have been adopted in the U.K. and Australia. U.K.-listed companies must use EU-adopted IFRS in consolidated financial statements and listed companies are permitted to use IFRS in individual accounts. Non-listed companies are permitted to use IFRS in group and individual accounts (FRC, 2005, p. 3). In Australia all reporting entities use Australian equivalents to IFRS (AIFRS), the standards issued by the Australian Accounting Standards Board (AASB) based closely on IFRS.[17]

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[15] The respondents were 561 individuals (chief executive officers/executives/partners, company secretaries, chief financial officers, legal advisers and other managers) from a range of business organizations.

[16] However, the Chantlink survey was commissioned by ASIC and is therefore not an independent study.

For IFRS to have the force of law, they must be endorsed by national (or supranational in the case of the EU) legislators. IFRS used in the U.K. and Australia are only consistent to the extent that they have not been modified by legislators, thus increasing or decreasing the level of comparability of the international standards in use. A well-known example of this process was the IAS 39 'carve outs', arising because the EU's Accounting Regulatory Committee modified IAS 39 before its endorsement as part of the 2005 'stable platform' of IASB standards (FRC, 2006). The reality is that standards applying in the U.K. and Australia can be modified by law-making bodies, if political forces were to support modification.

2. Standards Are Applied in the Same Way in Each Jurisdiction A goal of the IASB is to produce principle-based standards. IASB Chairman Sir David Tweedie stated that the IASB's future approach may involve an over-arching principle, ideally with no exceptions to either scope or requirements, few bright lines and only sufficient application guidance to enable preparers and auditors to obtain appropriate answers (IASCF, 2005, p. 7). A feature of principle-based standards is that they require interpretation by those applying the standards (Nelson, 2003; Schipper, 2003; Nobes, 2005). Therefore, it is inevitable that directors will make interpretations when preparing their company's financial statements. Further interpretations are made by external auditors in the process of their work, incorporating another level of judgment into the application of accounting standards. Tweedie stated that preparers, auditors and regulators must support the IASB by accepting the use of appropriate judgment (IASCF, 2005, p. 7).

Principle-based standards, by their nature, allow for different interpretations (FEE, 2004). This has been observed on a national basis, where language and culture are held constant. Disagreements about the interpretation of U.K. accounting standards among company directors, auditors and members of the FRRP are a case in point. It is expected that in the IFRS adopting world, differences in language, culture and past financial reporting practices are factors which may give rise to more widespread differences in interpretation (Schipper, 2005). The operations of global accounting firms can be expected to mitigate the extent of differences in interpretation (EFRAG, 2005). Further, the major accounting firms discuss difficult accounting issues amongst themselves to achieve a similar understanding and appropriate application of standards.

The IASB's international financial reporting interpretations committee (IFRIC) is internationally recognized as the central point for providing interpretation guidance about IFRS (IASPlus, 2006).[18] The IASB has stated that neither the

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[17] The main changes to IFRS made by the AASB relate to additional paragraphs that deal with applicability of standards for public sector and not-for-profit entities.

[18] The committee's role is formally stated as 'to provide timely guidance on newly identified financial reporting issues not specifically dealt with in IFRS or issues where unsatisfactory or conflicting interpretations have developed, or seem likely to develop in the absence of authoritative guidance with a view to reaching a consensus on the appropriate treatment' (IASB, 2006).

Board nor IFRIC will answer every question put to them, on the basis that judgment must be used in application of IFRS principles (IASCF, 2005). Predictably, some commentators have expressed concerns about IFRIC's ability to meet the demand for interpretations (EFRAG, 2005) reflecting divergent views about how much applications guidance should be provided by the IASB.[19] Nevertheless, IFRIC represents an important source of guidance for preparers, auditors and enforcement bodies. Present indications suggest that the philosophy behind IFRIC means that the bulk of decisions about interpretation rest with preparers and auditors.

The quality and level of independence of auditors may influence the extent to which standards are applied in a consistent way. In the past, ASIC and FRRP activities have assisted auditors in carrying out their role through the bodies' enforcement activities. Further developments in both countries have aimed to strengthen auditor independence. From 2004, ASIC has been given a formal (statutory) role in promoting audit quality. It is responsible for oversight of auditor education and enforcement of auditor independence requirements (ASIC, 2005a). In the U.K. this responsibility rests with the Professional Oversight Board (POB) (FRC, 2005).

3. National Enforcement Bodies Promote Consistent, Comparable Application of IFRS In an ideal IFRS adopting world, national regulators will make consistent decisions about application of IFRS. However, principle-based standards mean that, like company directors and auditors, the staff or members of enforcement bodies must make decisions about how accounting standards should be interpreted. Given that interpretations involve individual judgment, they will arrive at different decisions from directors and auditors in their own countries and from their counterparts elsewhere.

In recognition of this issue, international enforcement coordination mechanisms have been developed. The International Organization of Securities Commissions (IOSCO) has established a system for participating IOSCO members and other independent enforcement organizations to share information and consult in order to improve coordination and convergence.[20] Each national regulator retains the ability to deal with an issue in its own right but the system aims to facilitate consistency. ASIC is an IOSCO member and works closely with overseas regulators and international law enforcement agencies (ASIC, 2005a). While the FRRP is not a securities regulator and therefore not a member of IOSCO, it can participate through the FSA's membership. At a regional level, CESR has set up a coordination mechanism (European enforcers' coordination sessions or EECS) and begun a database of enforcement decisions. The EECS focuses on decisions taken or to be taken by local enforcers and gives input and feedback on specific cases in order to achieve consistency among European enforcers (FEE, 2006). Nevertheless, there is a danger that the coordination mechanisms will suffer from the difficulty of achieving international consensus in matters of law. Our review of ASIC and the FRRP's activities shows that regulators must be prepared to be 'tough'. It is possible that the lowest common denominator effect of international law (McBarnet and Whelan, 1999, p. 249) will affect the regulators' ability to take 'tough' decisions.

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[19] IFRIC has the resources to issue between eight and twelve interpretations per year and believes it has sufficient capacity to meet the demand for interpretations (IASCF, 2005). The IASB stated that IFRIC has made good progress, with three interpretations and six drafts published in 2005 (IASCF, 2005).

[20] A database of enforcement decisions was to be fully operational by the second half of 2006 and provide a reference point for future regulatory decisions (IOSCO, 2005).

A recent development which seems at odds with the goal of internationally coordinated decisions is the introduction of an Australian Financial Reporting Panel (FRP), which commenced operations in July 2006. ASIC promoted the creation of the FRP to provide an additional avenue for dispute resolution. Like the FRRP, the FRP is a peer review panel. Disagreements about accounting treatments in financial reports may be referred either by ASIC or by companies with ASIC's approval. However, decisions of the FRP are not binding and matters may be subsequently referred to court, where the court can consider the FRP's findings (FRP, 2006). Since Panel decisions are made by parties external to the securities regulators' coordination mechanisms, there is potential for these decisions to be inconsistent with those shared at coordination forums.[21]

As well as publicizing particular cases which show them to be active participants in the financial reporting process, both ASIC and the FRRP pursue an education role which can also be used to promote consistent and comparable enforcement. Both bodies have issued statements to clarify expected practice in relation to financial reporting, such as the FRRP's release in relation to financial instruments (Peel, 2001) and ASIC's about valuing options (ASIC, 2005b). They retain the ability to do this following IFRS adoption, although we can expect that any directions will relate more to relatively clear-cut matters and less to issues of interpretation. Given the IASB's accepted position that only IFRIC provides 'official' IFRS interpretations, neither ASIC nor the FRRP has, as at 2007, issued what could be considered 'interpretations' of accounting standards.

The earlier review of the activities of the FRRP and ASIC shows that both bodies had the power to have companies change their financial statements. As of 2006 they have retained this power. The FRRP has maintained its legal fund, so that it has the resources to take company directors to court if necessary. ASIC has been given increased powers under the CLERP 9 legislation, including the ability to issue infringement notices against companies in breach of continuous disclosure requirements.[22] Our discussion of the activities of the two bodies suggests that having the power, and indicating willingness to use it, is an effective force in promoting compliance.

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[21] We are indebted to Stephen Zeff for this observation.

[22] Under the *Corporations Act*, companies must immediately disclose price sensitive information to the ASX. If ASIC believes these continuous disclosure laws have been breached, it can issue an infringement notice which requires a monetary penalty to be paid. The aim of infringement notices is to address less serious breaches of continuous disclosure requirements in a timely and efficient way (ASIC, 2004).

The FRRP's first report on pro-activity suggests that it will continue to promote aspects of its operations which it considers have contributed to its success. These include a 'consensual approach to enforcement' which relies on companies responding in a full and timely manner and making use of the deterrent of monitoring activity (FRRP, 2005a, p. 2).

We now consider the implications for international enforcement of the types of case pursued. Table 3 classified items reported in cases as relating to disclosure, classification, recognition and measurement. This categorization is used as a starting point for consideration of the extent to which the type of case considered by the bodies could have potential international implications. Our evaluation of cases in this way turns upon the apparent amount of judgment and interpretation involved in the issue. Some cases seem to involve little judgment and would appear to be capable of resolution by an enforcement body without reference to other bodies. For example, some disclosure cases cover whether a matter has been reported or not (such as fair value table not included, FRRP case 19). Other disclosure cases imply judgment (such as inadequate disclosure on acquisition, FRRP cases 4, 5 and 6). Disclosure cases (17 per cent of ASIC items and 38 per cent of FRRP items) will likely pose least difficulty for the enforcement bodies in terms of comparable enforcement. Disclosure matters are more likely to have relatively unambiguous, reliable points of reference, such as the accounting standards themselves and disclosure checklists including those produced by the Big 4 accounting firms (Ernst & Young, 2005; KPMG, 2005). Disclosure matters do not directly affect companies' financial position and performance and can be less contentious than other matters. When they are less contentious, they are less likely to attract protracted disagreement between directors, auditors and enforcement bodies and less international attention.

Classification issues (4 per cent of ASIC items and 18 per cent of FRRP items) may not be as straightforward. Examples of classification items in FRRP cases are amortization of goodwill excluded from operating profit (FRRP, case 1) and including goodwill amortization as an exceptional item (FRRP, case 7). The extent to which guidance in standards is clear-cut or judgment is required will affect the extent to which matters will be referred to IFRIC or an enforcement coordination forum. This has already occurred in relation to classification of financial instruments under IAS 32. The matter is under consideration by IFRIC and is an agenda item for CESR's coordination forum (IASPlus, 2006).

The most difficult cases for international comparability would seem to be those concerning matters of recognition and measurement (46 per cent and 33 per cent of items for ASIC and 23 per cent and 21 per cent for the FRRP) as they potentially involve more judgment and interpretation. However, some measurement cases appear to be relatively straightforward breaches of accounting standards, for example, FRRP case 3 (intergroup sales not eliminated on consolidation). Indeed, among the measurement items reported in Appendixes A and B, many appear to be clear-cut, in that the company's treatment did not comply with accounting standards. Examples include ASIC case 10 and FRRP case 9 (advertising and staff costs/marketing costs capitalized rather than expensed) and ASIC case 11 (recognition of internally generated goodwill) and FRRP case 12 (goodwill written off instead of classified as an asset and amortized). A caveat is that some matters may not be as straightforward as they seem from the material presented in the appendixes. Recall that cases relate to audited financial statements, indicating that auditors have concurred with the treatment applied by the directors and both have taken a different view from that of the regulator.

CONCLUSION

This article provides an overview of the activities of two fundamentally different types of national enforcement body and explores how their features may contribute to consistent and comparable international enforcement of financial reporting. The adoption of IFRS in many countries from January 2005 has brought attention to the role of independent enforcement bodies. We considered the activities of two well-known and experienced bodies, the Financial Reporting Review Panel in the U.K. and Australia's security regulator, ASIC, over the period 1998–2004. The key questions we address are as follows: What were the distinctive features of the operations of ASIC and the FRRP prior to 2005? To what extent can these features assist the bodies to contribute to comparable international enforcement following adoption of IFRS?

There were many similarities in the operations of ASIC and the FRRP despite differences in the way cases were brought to their attention and in their participation in financial reporting surveillance. In the latter years of the study many changes occurred at both bodies, reflecting their highly political nature. In the period 2003–04 ASIC received increased funding to carry out extensive surveillance of financial reporting, to provide assurance about the quality of Australian financial reporting. From 2003, the mandate of the FRRP was changed to encompass proactive, risk-based surveillance to make the U.K. system of financial regulation more robust, although there was not a sense of dissatisfaction with the FRRP in the U.K.

Our evidence shows that, consistent with CESR's (2003b) view, national enforcement can be carried out by different types of body to a level which is acceptable in the bodies' respective communities. However, the extent to which enforcement is effective is difficult to gauge as much activity is behind closed doors. Commentators have argued the FRRP has been an effective body, citing its ability to have companies change their accounts without resorting to court action and its relatively low cost (Fearnley *et al.*, 2000; Hines *et al.*, 2001). ASIC's overall effectiveness has been questioned by some (Leibler, 2003). Nevertheless, it has an impressive history of activity in relation to financial reporting matters and can point to numerous cases where companies have modified their financial statements in line with its view.

We conclude that both bodies are well placed to contribute to comparable international enforcement through their experience as national enforcement bodies and their participation in regional and international forums organized by CESR or IOSCO. Both bodies have experience working with principle-based accounting standards, which can give rise to different opinions on appropriate interpretation. For both bodies approximately half of the cases in the period 1998–2004 concerned matters related to recognition and measurement, suggesting that the bodies' activities have involved them in making judgments about the 'correct' application of standards. This highlights the potential for cross-country differences in interpretations of accounting standards following adoption of IFRS. The extent to which ASIC and the FRRP are involved in coordination in relation to their decisions will reflect the demand by companies in their respective countries for consistent enforcement decisions.

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APPENDIX A

ASIC CASES, 1998–2004

LIST OF CASES PUBLICIZED BY ASIC (1 JULY 1998–30 JUNE 2004) SHOWING DATE AND COMPANY DETAILS; ISSUE AND IMPACT OF THE REGULATOR'S DECISION ON THE FINANCIAL RESULTS. THE INFORMATION WAS COLLECTED FROM ASIC AND COMPANY MEDIA RELEASES AND COMPANY FINANCIAL STATEMENTS.

	Date and company/ legal action	Sector	Total revenue (A$M)	Total assets (A$M)	Item	Category	Change in EPS (cents) %	Change in SHE (A$M) %
1	15 October 1998 St George Bank Limited	Banks	2,979	44,261	Accounting treatment of restructuring costs	Recognition element	(17) (33.33)	(78) (2.34)
2	1 March 1999 Novogen Limited	Pharmaceuticals and biotechnology	5.084	56.8	Explanation of change in accounting policy	Disclosure	–	–
3	9 March 1999 Seven Network Limited (1998) Enforceable undertaking	Media	803.05	765.6	Inappropriate capitalization of borrowing costs Carrying unrealized exchange loss to reserve rather than Profit and Loss Statement Recording treasury costs in year prior to which they were incurred	Recognition element Recognition element Recognition element	6 95	8.7 1.20
	Seven Network Limited (1997)	Media	799.5	717.6	As above	As above	(2.07) (9.62)	(8.7) (6.76)
4	3 May 1999 Media Entertainment Group Limited Court action	Media	11.97	9.106	Recognizing revenue when contracts made instead of when service provided	Recognition element	(17) (270)	(5.567) (42.20)
5	30 August 1999 North Limited	Minerals and forestry	2.163	3,856.15	Revaluation adjustments and their reversals at harvest are taken to the regenerative resource reserve rather than the Profit and Loss Statement	Recognition element	(1.2) (52.17)	(136.72) (7.20)
6	7 September 1999 Brisbane Airport Corporation Limited	Airport services	35.476	1,445.55	Method of amortization not in accordance with AASB 1021	Measurement	(2.88) (58.30)	(7.338) (3.17)

7	8 November 1999 Pacific Matrix Limited Court action	Technology hardware and equipment	7.79	38.432	Failure to maintain adequate records to substantiate the value of the company assets	Measurement	–	–
9	17 March 2000 Salan Pty Ltd Court action Enforceable undertaking	Hotels, restaurants and leisure	n.a.	n.a.	Inadequate disclosure about litigation regarding company's two most valuable assets	Lodgment disclosure	–	–
10	5 April 2000 One.Tel Limited	Telecommunications services	Nil	1,435.5	Advertising and staff costs capitalized as an asset rather than expensed	Recognition element	(1.66) (13.20)	(39.9) (4.05)
11	15 June 2000 AXA ASIA Pacific Holdings Limited	Insurance	2,849	26,825	Recognition of internally generated goodwill	Recognition element		(2159) (40.58)
12	22 November 2000 Solution 6 Limited	Software and services	280	322	Description of annualized revenues as 'forecasts' instead of 'targets'	Disclosure	–	–
13	1 December 2000 Phoenix Technology Corporation Limited	Commercial services and supplies	Nil	3.187	Advertising intellectual property as worth $70m when the independent valuation was $1m	Disclosure	–	–
14	26 February 2001 Realestate.com Limited	Software and services	3.765	10.619	Initial cash flow forecasts should have been corrected when it was realized that they could not be met	Disclosure	–	–
15	5 April 2001 Plexus International Limited Enforceable undertaking	Chemicals	34.092	10.584	Failure to disclose to the market changes in its anticipated revenue and profit performance	Disclosure	–	–
16	17 September 2001 Select Design Technologies Limited		n.a.	n.a.	Misleading or deceptive statements in relation to value of intellectual property	Disclosure	–	–
17	7 August 2001 Cable & Wireless Optus Limited Court action	Telecommunications services	5,224.4	10,934.1	Recognition of revenue for a lease agreement. Court action initiated by Optus. ASIC settled and Optus did not change its accounts	Recognition element		

APPENDIX A

(CONTINUED)

	Date and company/ legal action	Sector	Total revenue (A$M)	Total assets (A$M)	Item	Category	Change in EPS (cents) %	Change in SHE (A$M) %
18	15 March 2002 MYOB Limited Court action	Software and services	76.816	98.827	Recording the acquisition of asset at book value rather than cost to the company. Court action initiated by MYOB: Decision in favour of MYOB. The company did not change its accounts	Measurement		
19	10 July 2002 Redflex Holdings Limited Enforceable undertaking	Technology hardware and equipment	26.885	37.794	Incorrect capitalization of R&D and other expenses	Recognition element	–	–
20	2 September 2002 Baycorp Advantage Limited	Software and services	122.357	640.7	Capitalization of expenditure relating to legal proceedings	Recognition element	(3) (1.75)	(3.938) (0.72)
21	14 March 2003 Entertainment Media & Telecoms Corporation Limited	Telecommunication services	8.502	3.05	Use of fair value rather than notional value of shares for acquisition and calculation of goodwill	Measurement	(.04) (1.70)	0.535 74.40
22	18 March 2003 Harvey World Travel Limited	Hotels, restaurants and leisure	31.455	23.689	Recording revenue as gross price on travel products instead of net commission value	Measurement	–	–
23	28 March 2003 ECSI Limited	Commercial services and supplies	0.749	10.698	Including result of parent entity prior to formation of consolidated entity	Recognition group	(24)	(48.19)
					Incorrect value of goodwill in an acquisition	Measurement	(960)	(91.30)
24	23 April 2003 Prudential Investment Company of Australia Limited	Real estate	19.854	18.463	Ceased amortizing management rights	Measurement	(0.6) (54.50)	(0.158) (2.10)

25	5 June 2003 Sabina Corporation Limited	Real estate	1.18	0.394	Overstatement of value of financial assets	Measurement	(20.33) (597.9)	(2.54) (97.30)
26	8 August 2003 Strarch International Limited	Capital goods	9.017	10.66	Incorrect treatment of revenue and expenses in the Profit and Loss Statement	Classification	–	–
27	15 August 2003 Wilson Investment Taurine Fund Limited	Diversified financials	1.113	14.471	Treatment of re-evaluation of non-current assets	Measurement	(11.5) (974.6)	–
28	3 September 2003 National Telecoms Group Limited	Technology hardware and equipment	109.364	28.032	Multiple element arrangements of the same contract	Recognition element	(15.4) (50.5)	(18.754) (316.40)
29	18 September 2003 Futuris Corporation Limited	Food, beverage and tobacco	2.464	2,162.6	Recording revenue as gross sales instead of commission earned	Measurement	–	–
30	24 September 2003 Flight Centre Limited	Hotels, restaurants and leisure	626.039	795.552	Recording revenue as gross price on travel products instead of commission earned	Measurement	–	–
31	26 September 2003 King Minerals NL	Metals and mining	0.155	2.051	Misclassification between asset classes	Classification	–	–
32	30 September 2003 Astro Mining NL	Metals and mining	0.914	1.084	Incorrect valuation of exploration asset	Measurement	(3.35) (712.8)	(2.13) (55.90)
33	30 September 2003 Sunland Group Limited	Real estate	218.780	340.695	Writing off deferred expenditure directly against retained earnings	Recognition element	(1.6) (11.11)	(2.743) (2.80)
34	5 December 2003 Pacific International Limited	Hotels, restaurants and leisure	17.344	49.9	Recording revenue as gross price on travel products instead of commission earned	Measurement	–	–
35	24 February 2004 Kaz Group Limited	Software and services	429.968	414.197	Incorrect recognition of revenue for a controlled entity	Recognition group	(0.103) (118.4)	(0.851) (0.28)
36	25 February 2004 China West International Holdings Limited	Construction materials	417.214	0.252	A non-controlled entity was included in the consolidated financial statements	Recognition group	(0.0104) (1733.3)	(10.711) (103.80)
37	30 January 2004 OPSM Group Limited	Health care equipment and services	482.852	268.95	Revenue was recognized at time of order instead of delivery	Recognition element	(5.33) (121.9)	(5.762) (4.70)

APPENDIX A

(CONTINUED)

	Date and company/ legal action	Sector	Total revenue (A$M)	Total assets (A$M)	Item	Category	Change in EPS (cents) %	Change in SHE (A$M) %
38	29 March 2004 Pacifica Group Limited	Automobiles and components	987.938	740.57	Items recorded as deferred revenue should have been written off	Recognition element	(1.4) (3.83)	(2) (0.61)
39	12 March 2004 Newhaven Park Stud Limited	Hotels, restaurants and leisure	22.311	63.412	Recording broodmares at cost rather than market value	Measurement	(17.15) (261.83)	(7.514) (16.50)
40	5 April 2002 Child Care Centres Australia Limited	Commercial services and supplies	34.508	40.227	Incorrect capitalization of costs related to the formation of a strategic alliance	Recognition element	(0.56) (29.95)	(0.217) (13.36)
41	2 June 2004 Tempo Services Limited	Commercial services and supplies	736.394	182.53	Recording a receivable which had been brought to account in previous years	Recognition element	(1.696) (97.6)	(1.742) (5.50)
42	4 June 2004 Stockland Trust Group	Real estate	736.658	6,561.89	Goodwill arising from an acquisition was written off as an expense instead of being amortized	Recognition element	9.9 31.77	113.447 2.50

EPS = earnings per share; SHE = shareholders' equity; n.a. = not available.
Recognition group = concerned with boundaries of the group entity and nature of items to be included in group accounts; Recognition element = recognition of an element in the accounts and allocation of transactions to those elements according to their substance; Measurement = value to be attached to an element in the accounts; Omission = failure to include an item in primary statements; Classification = classification of items within a particular element in a primary statement; Disclosure = deficiency in the information content of the financial statements not directly affecting the primary statements (Fearnley *et al.*, 2000, pp. 24–5).

APPENDIX B

FRRP CASES, 1998–2004

LIST OF CASES PUBLICIZED BY FRRP (1 JULY 1998–30 JUNE 2004) SHOWING DATE AND COMPANY DETAILS; ISSUE AND IMPACT OF THE REGULATOR'S DECISION ON THE FINANCIAL RESULTS. FOR THE PERIOD 1 JULY 2000–30 JUNE 2004 THE INFORMATION WAS COLLECTED FROM FRRP PRESS NOTICES AND COMPANY FINANCIAL STATEMENTS. FOR THE PERIOD 1 JULY 1998–30 JUNE 2000 INFORMATION WAS OBTAINED FROM FEARNLEY *ET AL.* (2000, PP. 22–3)

	Date and company	Sector	Turnover (total revenue) (£M)	Gross (total) assets (£M)	Item	Category	Change in EPS (pence) %	Change in SHE (£M) %
1	22 July 1998 Reuter Holdings	Media and photography	2,882	2,836	Amortization of goodwill excluded from operating profit	Classification		
2	7 August 1998 H&C Furnishings	General retailers	152	71	Valuation of consideration paid for acquisition	Measurement		
					Non-compliance with disclosure requirements (FRS 1, FRS 3, FRS 8, SSAP 15, CA 1985)	Disclosure		
3	2 September 1998 Photo-Me International	Media and photography	159	66	Intra-group sales/cost of sales not eliminated on consolidation	Measurement		
4	20 October 1998 Concentric	Engineering	150	94	Inadequate disclosures on acquisition, particularly with respect to fair value table and cash flow statement	Disclosure		
5	24 February 1999 Aim Group	Engineering	64	47	Reorganization costs treated as a liability on acquisition	Recognition element	(24.60)	(5.86)
					Inadequate disclosure re acquisition and policy change	Disclosure		
6	28 October 1999 Photobition	Media and photography	38	43	Inadequate disclosure of results of acquisition	Disclosure		
					Non-disclosure of geographic analysis	Disclosure		
7	10 January 2000 PWS Holdings	Insurance	11	167	Depreciation of goodwill treated as exceptional	Classification		
8	18 February 2000 Eurocity Properties	Property (second tier market)	0	4	Non-disclosure of executive directors incentive scheme	Disclosure		

APPENDIX B

(CONTINUED)

	Date and company	Sector	Turnover (total revenue) (£M)	Gross (total) assets (£M)	Item	Category	Change in EPS (pence) %	Change in SHE (£M) %
9	24 February 2000 Sinclair Montrose Health	Health	79	43	Marketing costs capitalized as development expenditure Disclosure of exceptional item and amortization of goodwill	Recognition element Classification	(330.24)	(37.57)
10	11 July 2000 Ensor Holdings Plc	Concrete block and brick manufacturing	17.729	10.379	Transfers between reserves in Profit and Loss Statement instead of in notes	Classification	–	–
11	18 October 2000 London Underground Limited		1.223	9177.5	Grants shown in capital grant reserve instead of deferred income Inadequate disclosure of nil value of certain infrastructure items	Classification Disclosure		
12	23 February 2001 Artisan UK Plc	Land subdivision	81.365	78.54	No disclosure in respect of FRS13 Goodwill written off instead of classified as an asset and amortized	Disclosure Recognition element	–	(7.397) (41.24)
13	7 March 2001 Wiggins Group Plc (now Planestation Group Plc)	Property, real estate and development	8.582	55.111	Ineligible expenditure capitalized as development expenditure Incorrect recognition of revenue Inadequate disclosure in respect of FRS13 Incorrect measurement of pension costs Anticipated proceeds of sale wrongly included in debtors due within 12 months EPS incorrectly calculated in 2000 accounts	Recognition element Recognition element Disclosure Measurement Classification Measurement	(4.06) (141.5)	(35.36) (77.25)
14	4 July 2001 Northgate Plc	Motor vehicle	261.801	400.6	Bonuses incorrectly recorded as deferred income	Recognition element	–	–
15	18 July 2001 Avesco Plc	Corporate services	102.666	77.666	Inadequate disclosure of acquisition, particularly with respect to fair value	Disclosure	–	–

16	28 August 2001 Princedale Group Plc	Plastic materials and basic shapes	62.826	17.156	Loss on subsidiary shown below net profit after tax instead of operating profit Inadequate disclosure in respect of FRS 13	Classification Disclosure	–	–
17	11 September 2001 Wyevale Garden Centres	Retail nurseries and garden stores	166.842	298.69	Non-depreciation of short leasehold properties	Measurement	(2) (8.97)	(1.754) (1.20)
18	26 September 2001 Groupe Chez Gerard	Restaurant and leisure	38.314	27.026	Implementation of FRS 15	Measurement	(3.6) (27.27)	0.61 5.65
19	6 November 2001 QA Services (No. 2) Ltd	Computer programming services	140.7	121.2	Fair value disclosure table not included Inadequate disclosure re acquisition	Disclosure Disclosure	–	–
20	26 February 2002 Liberty International Plc	Investment	331.0	4,456.8	Inadequate disclosure re acquisition in respect to special circumstances	Disclosure	–	–
21	26 July 2002 Equator Group Plc	Motion picture and video production	1.358	15.847	Failure to amortize intangible assets Market value used instead of fair value when valuing an intangible acquisition	Measurement Measurement	(0.56) (26.04)	(0.181) (1.66)
22	31 January 2003 Finelot Plc	Gold ore mining	175	1.308	Ineligible expenditure capitalized as development expenditure	Recognition element	(4.78p) (66.67)	(0.966) (38.94)
23	14 February 2003 Kensington Group Plc	Loan brokers	39.9	185.7	Non-consolidation of subsidiary undertakings	Recognition group		
24	27 May 2004 Thorns Group Plc	Equipment hire	5.099	9.837	Non-depreciation of hire stock	Measurement	(3.7) (18.3)	(0.868) (52)
25	9 June 2004 McKechnie Holdings Ltd	Industrial	n.a.	n.a.	Cash Flow Statement not provided No consolidated accounts prepared	Omission Recognition group		

EPS = earnings per share; SHE = shareholders' equity; n.a. = not available.
Recognition group = concerned with boundaries of the group entity and nature of items to be included in group accounts; Recognition element = recognition of an element in the accounts and allocation of transactions to those elements according to their substance; Measurement = value to be attached to an element in the accounts; Omission = failure to include an item in primary statements; Classification = classification of items within a particular element in a primary statement; Disclosure = deficiency in the information content of the financial statements not directly affecting the primary statements (Fearnley *et al.*, 2000, pp. 24–5).

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CHRISTINE RYAN, JAMES GUTHRIE AND RON DAY

Politics of Financial Reporting and the Consequences for the Public Sector

This article examines the political processes surrounding public sector accounting standard setting, in particular, the Australian decision to adopt sector-neutral International Financial Reporting Standards (IFRS). It contends that the history of private and public sector involvement in the accounting standard setting process to date, and recourse to regulatory theory, assist in understanding these contemporary developments. The article reveals that private sector interests have dominated accounting standard setters at all important stages of standard setting in Australia. It concludes by arguing that, given this continued neglect by standard setters, if public sector financial reporting standards are to remain relevant to the public sector, then it may be necessary for public sector regulators to set their own standards.

Key words: Financial reporting; IFRS; Regulation; Sector-neutral; Standard setting; Theory.

Australia and New Zealand are two countries that have followed a sector-neutral approach to accounting standard setting (Hooks and Tooley, 2006). Simpkins (2006, p. 100) argues that, in the U.S.A., Canada and the U.K., where a separate standard setting board has responsibility for the public and private sectors, more attention is paid to the needs of public sector users. With Australia's sector-neutral approach, the introduction of international accounting standards has posed dilemmas for Australian standard setters, specifically in relation to the public sector. This article considers the political process surrounding the setting of Australian public sector financial reporting standards and argues that an examination of private and public sector involvement in the process to date will inform the current dilemmas for the public sector caused by the decision to adopt private sector International Financial Reporting Standards (IFRS).

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Australia, until 2000, had a history of both private and public sectors developing financial reporting standards to suit their own unique operating environments (Miller, 1991). However, in January 2000, the Public Sector Accounting Standards Board (PSASB) merged with the Australian Accounting Standards Board (AASB) to form a 'new' AASB. The resulting standards applied to the private and public sectors. Critically, the new AASB was effectively captured by a mix of private interests, government strategy and international developments. In June 2002, the new AASB decided to adopt IFRS in Australia, effective in 2005. Because of their sector-neutral[1] stance, this decision covered not only the private, but also the public sector. The purported benefits to capital markets, and to the efficacy of financial reports for multi-listed companies were widely reported (Saudagaran and Meek, 1997; AASB, 2002; Lonergan, 2003). In contrast, far less attention was given to the consequences for the public sector.

There have been persistent and consistent warnings about the differences between the public and private sectors and the dangers of applying private sector accounting standards to the public sector (see, e.g., Guthrie, 1987, 1990, 1998; Walker, 1987; Ma and Mathews, 1993; Conn, 1996; Mack and Ryan, 2006). Recently, Barton (2005) has argued persuasively that the application of professional accounting standards to the public sector has not been particularly successful. The move to sector-neutral IFRS has only exacerbated these problems because the focus of IFRS is on the private sector. But how did the situation for the public sector reach this stage? In spite of early warnings, how and why is there a situation where all Australian public sector reporting entities had to apply IFRS in 2005, when there is little evidence to suggest that other countries, except New Zealand, were planning to follow this path for their public sector entities?

There have been various perspectives to the introduction and implementation of accrual accounting in the public sector. For instance, some link it to the wider new public management and new public management financial reforms (see, e.g., Olson *et al.*, 1998; Guthrie *et al.*, 1999; Newberry, 2003); others link it to the power of the professions and the need for the sale of services by large accounting firms (see, e.g., Christensen, 2002, 2005); and still others to the prevailing public choice ideology (see, e.g., Barton, 1999, 2005). This work undertakes an analysis of three decades of public sector accounting regulation and views this history by providing some explanations of the political processes regarding it.

Puxty *et al.* (1987, p. 282) describes accounting regulation in advanced capitalist societies as the outcome of recurring struggles within, and between, the organizational principles of *market* forces, *state* bureaucratic controls and *community* ideals, and the parties, agents and interest groups that represent them. Their theoretical constructs provide 'a framework for exploring and evaluating contemporary challenges to the authority of regulatory institutions of accountancy' (p. 274) within an historical and political context. This framework recognizes the political dimensions and interplay of competing interests in the control of regulatory institutional arrangements. The framework has been used by researchers to seek to explain accounting regulation in particular instances across nation states (see, e.g., Willmott *et al.*, 1992, for research and development accounting), and is used here as the lens through which to view thirty years of public sector accounting standard setting in Australia.

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[1] The term 'sector-neutral' is widely used in Australia and is taken to mean the one set of accounting standards for private, public and non-profit sectors. The term has been re-expressed by the AASB in February 2006 as 'transaction-neutrality', meaning like transactions are treated in the same manner by all entities (Simpkins, 2006, p. 18). For the purposes of this article the term 'sector-neutral' is retained because of its widespread use.

It is argued that, while Australia has a history of both private and public sectors developing financial reporting standards to suit their own unique operating environments, private sector accounting issues have always taken precedence over those of the public sector. Recent trends in internationalization have highlighted the ongoing tension between both sectors.

THEORETICAL BACKGROUND

Puxty *et al.* (1987) provide a theoretical framework to examine the interplay of major influences and modes of regulation, to highlight how these affect the content and consequences of accounting policies and practices. It emphasizes that the provision of accounting information is a political process, and not merely a technical matter. The framework also contains a historical dimension and, as such, is capable of explaining the origins and transformations of different modes of regulation through time. In addition, it recognizes the role of human agency in the process of accounting regulation, noting that solutions are often the outcome of struggles between various interests and actors within a certain socio-political context. Other regulatory theories, such as private interest theory (Stigler, 1971) and regulatory capture theory (applied to Australian private sector accounting standards setting by Walker, 1987) also inform the political dimensions and interplay of competing interests in the control of regulatory institutional arrangements. However, because the Puxty *et al.* framework recognizes the broader context of the institutional arrangements as well as the particular interests of various actors within that context, it is deemed here to be optimal for analysing the development of the institutions of public sector accounting through time, and in this particular instance, the development of public sector accounting in Australia.

Puxty *et al.* (1987, p. 275) suggest that the mode of regulation existing at any one point in time is an outcome of the nexus between three organizing principles: *market forces*, *bureaucratic/hierarchical controls* and *communitarian ideals*. In terms of the disclosure of accounting information, the principle of *market forces* acknowledges the contracts between organizations, suppliers and auditors and what is disclosed is left to the managers of the organizations and the various other parties to decide (Willmott *et al.*, 1992). *Bureaucratic/hierarchical controls* refers to the coercive power of the state in terms of its monopolistic power to set rules and procedures, and this is determined by the role of the state in securing equitable treatment for all of its citizens. Thus, in relation to the disclosure of accounting information to the public, the state may intervene to set a minimum level of disclosure through legislation, or indeed higher levels of disclosure if tensions arise in relation to the level of information provided to citizens. *Communitarian ideals* refers to the ideals of ethical conduct, common values, reliability, mutual esteem and trustworthiness. This highlights the role of the profession and the expertise of accountants in shaping accounting practice. Puxty *et al.* argue that accounting regulation can only be understood by the nexus between these three principles, the structural conflict within the principles and the critical role played by individuals and groups of participants in the process operating within broader politico-economic relations. Thus, accounting regulation at any point in time is the product of the particular mix of these principles (Willmott *et al.*, 1992, p. 37).

Using these principles of regulation, Puxty *et al.* (1987) identify several theoretically possible modes of regulation along a continuum. At one extreme is what they identify as the 'liberalism mode', where regulation is supplied exclusively by the operations of the market. At the other is where the state sets the entire regulation system—the mode called 'legalism'. Puxty *et al.* argue that neither of these 'pure' forms exists, and what is more likely are some approximate forms of regulation. More useful for empirical analysis are the 'mixed modes' of regulation. 'Associationism' is close to liberalism, where there is some dependence upon the principles of community, but still a heavy reliance on market principles. Then there is the mixed mode of 'corporatism', where the state actually incorporates the organized interest groups into their own system of regulation. As such, the state is reliant on the professional associations to achieve their desired purpose.

Viewed through this lens, it is argued that accounting regulation in Australia initially followed an associationism approach in both the private and public sectors, with standard setting largely left to the accounting profession, and compliance sought through the professional code and ideals of its members. In relation to the private sector, Miller (1991) describes shifts in the regulatory framework towards corporatism in the co-regulatory period between 1984 and 1991. Parker (1988, quoted in Miller), also described the reporting standard setting system in this period as falling somewhere between associationism and corporatism, but he suggested that it moved closer to corporatism, when the accounting standard setting boards sponsored by the profession (AcSB) and the government (ASRB) merged. Miller bases this argument on the introduction of the national scheme of *Corporations Law*, and the purported removal of the true and fair override in June 1991, which finally gave the Federal government decisive authority in the co-regulatory arrangements with the restructured AASB. [Editorial note: Several editorials (Vol. 40, No. 2; Vol. 41, No. 2; Vol. 42, No. 2) have noted that arguably the override persists.] Further, the power of veto over new standards was shifted from the Ministerial Council of the professional bodies to parliament, where the ASRB standards were gazetted and then given legal backing.

Meanwhile, the professional-bodies-sponsored PSASB was not subject to these changes, and was left to continue in an associationism approach, issuing accounting standards for the non-corporate sector. However, the PSASB was dominated by the private sector standard setting board and was hampered in its endeavours by an agreement to align its program with the private sector AASB (Ryan, 1998). Despite this, and only with an injection of funds from State and Commonwealth

FIGURE 1

HISTORY OF AUSTRALIAN PUBLIC SECTOR ACCOUNTING STANDARD SETTING

	1983	2000	2002	2005	200?
Liberalism →	Associationism →	Corporatism →			→ Legalism
	PSASB formed	PSASB disbanded			
		Sector-neutral standards			
		International harmonization	Adoption of IFRS decision	IFRS used in reporting period 2005	
					Consequences

Departments of Finance, some non-corporate sector-specific accounting standards were initiated for the public sector (Ryan, 1999). This was to be short lived, however, as domination by the AASB and pursuit of a seemingly parallel agenda raised suggestions that the PSASB and AASB ought to be merged (Ravlic and McGregor, 1999). They were in January 2000; and a new restructured AASB was formed under the control of the Financial Reporting Council (FRC).[2] From this point on, sector-neutral accounting standards were pursued, and the public sector accounting standard setting process was subsumed into a private sector corporatism framework. In 2002, the FRC issued the strategic direction to the AASB (Simpkins, 2006, p. 8), that Australia was to work towards the adoption of accounting standards that were the same as those issued by the International Accounting Standards Board (IASB), whose standards only apply to the private sector.

Figure 1 illustrates the historical development and highlights public sector accounting standards development within the Australian context. It began with liberalism prior to the establishment of the PSASB, then to the birth of associationism in 1983 when the accounting professional bodies became involved in developing standards through the PSASB. Moves to associationism strengthened with co-regulatory arrangements that followed the establishment of the ASRB in 1984 (allowing it to approve mandatory standards for the corporate sector), and allowing the PSASB to issue non-mandatory standards for the non-corporate sector. Finally, the merger of the PSASB and existing AASB into the 'new' AASB under the control of the Financial Reporting Council (FRC) in 2000 represented the demise of a separate standard setting body.

Puxty *et al.* (1987, p. 275) argue that 'the institutions and processes of accounting regulation in different nation states cannot be understood independently of the historical and political-economical context of their emergence and development'. Guthrie (1990) broadens the scope to consider not only structural matters, but also the views and actions of individual actors. It is against these arguments that a historical background is presented. Explained are some of the motivations for, and contradictions in, the changes in regulatory institutional arrangements that led to the decision to adopt sector-neutral international financial reporting standards.

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[2] The FRC is a statutory body under the *Australian Securities and Investments Commission Act 2001* (ASIC Act), as amended by the *Corporate Law Economic Reform Program (Audit Reform and Corporate Disclosure) Act 2004*. It is comprised of the Australian Accounting Standards Board and the Auditing and Assurance Standard Board.

FROM LIBERALISM TO ASSOCIATIONISM TO CORPORATISM: THE SHORT LIFE OF THE PSASB IN AUSTRALIA

The level of involvement of different institutions in the public sector standard setting process is important in understanding the emergence of practices, institutions and attitudes. The setting of rules, directives or standards for public sector accounting and reporting was, historically, in the hands of State and Federal Treasuries and Departments of Finance up until the early 1970s with little professional involvement (Nicholls, 1991; Ryan, 1998). For the private sector, though, the accounting professional bodies in Australia became involved in accounting standard setting in 1966, through their newly established Australian Accounting Research Foundation (AARF), which was jointly funded by the two major professional accounting bodies. Few accounting standards were issued until around the mid-1970s, and compliance was limited to voluntary conformity by members to the ideals of the members of the accounting professional bodies. Intervention from the state was minimal; however, there was legislation following U.K. precedent (since 1844) requiring a general true and fair view to be provided in private sector financial statements. In terms of the Puxty *et al.* (1987) framework there was a 'liberal order'.

However, from the mid-1970s there was constant pressure exerted by Auditor-Generals (particularly from the Commonwealth, New South Wales and Victoria) on the accounting profession to consider accounting standards for the public sector (Guthrie, 1987, 1990; Ryan, 1998). This pressure was also exerted by rank and file professionals working through the Australian Society of Accountants' National Government Accountants' Committee. This was the first example of the public sector needing to apply pressure to the accounting standard setters for their needs to be acknowledged. However, the profession failed to respond. As a result, the Commonwealth Auditor-General, in conjunction with the Department of Finance, started to produce their own public sector accounting standards (Guthrie, 1987). In 1982, a Report of the Joint Committee of Public Accounts (JCPA) proposed a more coherent approach to government accounting and reporting and the need for the public sector to establish a Public Sector Accounting and Audit Committee (JCPA, 1982). The public sector was promoting its own accounting standards setting body because, up to this point, the profession had shown a complete lack of interest in the sector (Ryan, 1999).

In light of the 1982 JCPA Report, the accounting professional bodies responded by establishing in 1983 a Public Sector Accounting Standards Board (PSASB), to work alongside the AcSB, within their jointly funded AARF structure. A self-regulation regime was put in place by the accounting professional bodies under this institutional arrangement, resulting in the concept of general purpose financial reporting (GPFR) for private and public sectors. This effectively resulted in the private sector AcSB and the public sector PSASB combining to develop a set of common Australian Accounting Standards (AAS) which members of both sectors were required to follow. Ryan (1999) argues that this co-regulatory arrangement produced a colonized public sector accounting standard setting process influenced by private sector regulators from an early stage. There was little consideration given to the interests of, and consequences for, the public sector with these institutional arrangements.

During the 1980s there were several structural changes to the private sector standard setting process amid growing concerns about the level of non-compliance with accounting standards from both the accounting professional bodies and the government (see Clarke *et al.*, 2003). In response to this, the government established an independent Accounting Standards Review Board (ASRB) in January 1984 and transferred the control of standard setting for the corporate sector to it from the accounting profession.[3] Enforcement of ASRB approved standards was made mandatory, subject to a true and fair override in the *Corporations Law*. Concerns about the independence of the ASRB continued over the next few years (Walker, 1987) and, in 1988, the professional board was merged with the AASB to form a renamed Australian Accounting Standards Board (AASB).

For the public sector, the reasonably new PSASB of AARF continued throughout the 1980s to develop non-mandatory standards (AAS series) with application to the non-corporate sector, including the public sector. The ASRB and the PSASB agreed to work on parallel standards for each sector and joint projects, including the conceptual framework that would be used to cover both sectors.[4] Once again, several commentators have shown that the agenda of the private sector dominated as a result of this collaboration, and progress on the development of public sector standards was hampered as a result (Shand, 1989; Ryan, 1998; Wise and Wise, 1985).

Towards the end of the 1980s, commentaries by members of the profession suggested that the public sector had become frustrated by the lack of progress on public sector accounting standards. This resulted in the Treasuries and Departments of Finance in each Australian jurisdiction to commence funding the PSASB to produce specific public sector standards (Ryan, 1999). This was another example of the public sector needing to press the professional association accounting standard setters to achieve their aims.

In the 1990s, three new public sector-specific accounting standards were issued by the PSASB: AAS 27, *Financial Reporting by Local Government* (1991); AAS 29, *Financial Reporting by Government Departments* (1993); and AAS 31, *Financial Reporting by Government* (1996). However, because the Australia accounting standard setters applied a sector-neutral conceptual framework (Barton, 1999, 2002a; Newberry, 2001, 2002; Carnegie and Wolnizer, 2002), this trilogy of standards only outlined some differences in various public sector administrative arrangements, but did not change any basic concepts or principles (Barton 2005). Therefore, their inclusion with other standards for profit seeking entities effectively treats them in the same way as separate industry standards, rather than as fundamentally different from profit seeking industries (Ryan 1998; Barton, 2002b). Moreover, other, mainly public sector issues, such as infrastructure and heritage assets, were not given adequate consideration, being addressed using sector-neutral conceptual framework principles rather than being specifically addressed in the standards (Alfredson, 2002; Pallot, 2000; Highland, 2004; Walker *et al.*, 2000).

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[3] The profession continued its own private standard setting development process via its Accounting Standards Board (AcSB) of AARF. These needed to be reviewed and approved by the ASRB to be issued as a standard.

[4] The conceptual framework is an overriding set of principles within which specific accounting standards are set (AARF, 1993).

No doubt this lack of momentum on the setting of public sector accounting standards contributed to the lack of institutional opposition to the Corporate Law and Economic Reform Program (CLERP) recommendation, whereby the standard setting process was to be overseen by the Financial Reporting Council (FRC), and the PSASB and the AASB were to be merged. As noted, these new institutional arrangements were effective from 1 January 2000. The new AASB adopted a sector-neutral approach to the setting of accounting standards in Australia (Simpkins, 2006, par. 1.3).

Notwithstanding this, concerns had been raised in the early 1990s that the needs of the public sector would fall further behind those of the private sector, and public sector-specific projects that were still outstanding would not be advanced (Ryan, 1995). Detailed analysis of public sector accounting standard setting during this decade clearly reveals the domination of the public sector interests by the private sector agenda (Chua and Sinclair, 1994; Ravlic, 1998; Ryan, 1998). As the 1990s drew to a close, there was renewed interest in international harmonization and convergence, where once again it would become obvious that the public sector agenda was secondary to that of the private sector.

THE INTERNATIONAL HARMONIZATION AGENDA

Harmonization, convergence and adoption are three strategies that have been used in Australia in pursuing a policy of internationalizing domestic accounting standards (Howieson and Langfield-Smith, 2003). A harmonization strategy attempts to ensure, as far as is possible, that compliance with domestic accounting standards also means compliance with international standards. A convergence strategy aims for active involvement in the process of developing a set of accounting standards intended for eventual future global adoption. Finally, adoption is the use of the content and wording of one country's standards by another.

In July 2001, the FRC foreshadowed a convergence policy that proposed to adopt IFRS and make them equally applicable to the public, as well as to the private sector (noted in Simpkins, 2006). This not only referred to harmonization and convergence with the standards of the IASB, but also to the International Financial Accounting Committee's (IFAC) Public Sector Committee (PSC) standards, with the intention of giving equal recognition to the need to harmonize AASB standards with both IASB and PSC standards. A formal announcement occurred in July 2002 when the FRC stated that Australia would work toward the full adoption of IASB standards, from reporting periods in 2005 (Simpkins, 2006). This emerged because the FRC issued a strategic direction to the new AASB about adoption (Simpkins, 2006, pp. 8–9). The decision by the AASB to adopt within this short timeframe may have been influenced by the decision of several other countries to adopt by this date (Abernethy, 2002). However, a key difference here is that other countries have limited their adoption program to include only listed companies, and then only at the consolidated level. Australia was operating under a sector-neutral policy for accounting standards. Therefore, Australia adopted IFRS standards applicable for all reporting entities across all sectors—private and public. While the trilogy of the government standards AAS27, 29 and 31 were originally planned to be retained and revised, the AASB decided in its June 2005 meeting that they would be withdrawn by 30 June 2007, in line with the sector-neutral approach. The FRC's decision to adopt IFRS using the sector-neutral approach is a further example of the dominance of the private sector agenda over the public sector agenda.

In summary, taking into account the analysis of the various actors and institutions, the saga appears consistent with Puxty *et al.*'s (1987) corporatism strategy — where the state cooperatively used other parties, interest groups and events to enable it to achieve this momentous change in policy. The climate for this change was opportunistic, given the public and government reaction to major private corporate collapses that had occurred in the U.S. and Australia (Guthrie and Parker, 2003). These collapses were a major impetus for the Sarbanes-Oxley reforms in the U.S. and CLERP reforms in Australia, including the establishment of the FRC, effectively giving the government control in the policy direction of the AASB and the internationalization strategy.

CONSEQUENCES FOR THE PUBLIC SECTOR OF INTERNATIONAL HARMONIZATION

The contemporary internationalization agenda illustrates the three themes that have been evident throughout the history of Australian public sector accounting standard setting. First, it highlights the neglect given to the public sector at a broad policy-making level. Second, it makes clear the lack of resolution, at a more micro level, of public sector issues that have been on the agenda since the early 1990s. Third, it demonstrates that accounting standard setting is a political process and thus there is a need for involvement of Departments of Finance or Treasuries (i.e., the public sector's own regulatory body) to push the public sector priorities to the AASB.

Neglect of public sector issues throughout the 1980s and 1990s has been demonstrated above. This is further evidenced by the internationalization agenda of the twenty-first century. The major objective of the IASB since its formation has been to develop global financial reporting standards for the private sector (Simpkins, 2006). From the outset, Ball (2002) indicated that the failure to consider the public sector when IASB standards were developed for the private for-profit sector created a major difficulty. It is worth noting that while the IASB is not precluded from developing standards for the public sector, it does not have a public sector orientation. Moreover, the IASB's current concern with the convergence of its international standards with the FASB's standards means that attention to the public sector is even less likely. Indeed, the current project of converging the conceptual frameworks of both the IASB and the FASB serves to illustrate the problem. The Discussion Paper on the Conceptual Framework, ITC 11 (AASB, 2006), is explicitly oriented towards the private sector. The position taken in the paper is that the primary users of the financial statements are said to be investors and creditors and it is argued that, if their needs are catered for, then so will be the needs of all other classes of users. The concept of a broadly defined stakeholder group, as found in the public sector, is not considered. Further, the fundamental objective of financial reporting is seen to be decision usefulness rather than public accountability for which most public sector users require financial reports (Mack and Ryan, 2006).

The second theme concerns the lack of resolution of public sector issues that have been on the agenda since the early 1990s. Again, the concern is that these issues are not receiving the priority attention needed because of the focus on private sector issues through the international accounting agenda. Public sector issues that have been on the agenda and have been identified as needing attention include: accounting for revenues from non-reciprocal sources such as taxes and transfers; accounting for social policies of governments; non-financial reports; measurement of infrastructure and heritage assets (Alfredson, 2002; Mackintosh and Sutcliffe, 2003; Highland, 2004). The treatment of revenue from grants is a good example of the effect that a private sector orientation can have on the financial reports of public sector organizations (Ryan *et al.*, 2000; Flack and Ryan, 2005). Under AASB118 revenue is regarded as being controlled in an organization once it is received. For a private sector organization which deals with reciprocal transactions and hence primarily receives revenue from direct performance of services for a client, this is most likely to accord with the timing of the service. However, in a public sector situation, many transactions are non-reciprocal, that is, there is not any direct linking of the receipt of revenue (particularly from a government grant) with the service provision. The services are provided to a different set of clients and often at a much later date from when revenue is controlled. However, in order to comply with the accounting standards, revenue must be recognized when it is received (controlled). In public sector organizations this often causes the situation where there is a distortion of the accounts. The private sector orientation of the standard setters has again dominated those of the public sector, to such an extent that it could be argued that the revenue information provided in public sector accounts is misleading (Ryan *et al.*, 2000; Flack and Ryan, 2005).

The third theme involves the political nature of the standard setting process. The main argument here is that the private sector dominates the standard setting process. The prior section discussed that, in the early 1990s, in order for the PSASB to move away from the controlling agenda of the AASB, the public sector's own regulatory and policy body (i.e., Departments of Finance) needed to become involved and resource the push for public sector priorities to the AASB.

A similar pressure can be seen again early in 2000 when, in an effort to have prominence given to public sector issues in the push for internationalization, the Australian Heads of Treasuries Accounting and Reporting Advisory Committee (HOTARAC) formed a working group to expedite and prioritize the forward work programs of the IASB, AASB and the UIG (Challen, 2003). According to Challen, the highest priority was harmonization of finance reports based on GFS with financial reports based on GAAP, to obtain greater comparability across jurisdictions and provide a transparent link between budget presentation and financial reporting. GFS is a financial reporting framework developed by the IMF for presenting government finances (Parker, 2003). The Australian Loans Council also requires government and the public sector in Australia to use the GFS system when presenting their budget and statistical reports. In August 2002, the Heads of Treasuries (HoT) made a submission to the FRC to issue a public sector standard that would facilitate a single reporting regime for the public sector. As a result of this pressure, the FRC issued a strategic direction under s. 225 of the *Australian Securities and Investment Commission Act 2001*, which required the AASB to pursue the harmonization of GFS and GAAP for public sector financial reporting. The importance of this pressure can be seen as there had only been one other direction, that is, the internationalization directive (i.e., to work towards the adoption of accounting standards that were the same as the IASB).

Again, the need for direct intervention of public sector interests over the standard setters is starkly obvious. As Parker (2003, p. 66) observed, 'the AASB has been directed to draw on the best GFS principles and existing Australian GAAP . . . to develop a new, single reporting framework for government'.

CONCLUSIONS

This article has examined the organizational setting of Australian public sector accounting standards over the past four decades. It has argued that, in line with Puxty *et al.*'s (1987) model of accounting regulation, a corporatist approach existed, where the interests of the private sector, rather than those of the public sector, have dominated the actions of accounting standards setters. This was established by examining the historical public sector accounting standards regime, as well as the contemporary arrangements for the adoption of sector-neutral accounting standards in Australia.

The current debate over the internationalization of accounting standards is reminiscent of a continuing struggle that has occurred throughout the history of accounting standards setting in Australia. As various shifts occurred in the Australian regulatory environment, a recurring theme has been the dominance of private sector interests in standard setting over the interests of the public sector. Except for a few occasions where the public sector itself took the initiative and argued their unique features and needs, public sector standard setting has been required to tag along, subordinate to the agenda of the private sector. The most recent instance is the push for harmonization and adoption of international financial reporting standards under a sector-neutral approach.

Our conclusions have strategic implications for policy makers and their agents in Australia. If they seek to ensure that the financial reports of government are relevant and able to be understood by the variety of stakeholders to whom public sector agencies are publicly accountable, then they need to move beyond acceptance of the standardized push to international accounting standards and legislate for standard setting arrangements that are appropriate for the public sector, rather than the private sector. It would appear as if a 'single set of . . . fully sector-neutral (or transaction-neutral) standards is not a realistic option post IFRS adoption' (Simpkins, 2006, p. 107). However, if we can take lessons from the Australian history then there will be a need for the public sector to set their own standards so that their needs are met. As the 1980s Australian history has shown, if the public sector does not have its needs met by the standard setters, then they do have the power to set their own standards (Guthrie, 1990). The interesting question is: Can the accounting standards setters continue to ignore such a powerful and large constituency?

Future research is needed to look at how the political process will unfold over time, and whether a consistent body of pressure will move the standard setters' attention away from a private sector standard agenda. In addition, empirical research to examine the application of IFRS to individual public sector entities, and to assess the impact and consequences of the sector neutral policy, is imperative.

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Beyond a Code of Professional Ethics: A Holistic Model of Ethical Decision-Making for Accountants

Most accountants do not realize—until it is perhaps too late—that virtually all aspects of their work have an ethical dimension. They often lack the knowledge and skills to analyse issues effectively, and when confronted with conflicting ethical problems cannot choose the way to move forward that is consistent with their own values and/or the profession's code of professional conduct. This article proposes that the accounting profession worldwide has simply attempted to prescribe simplistic solutions to often complex ethical problems. It endeavours to provide an alternative approach based on the process of 'ethical knowing' (Melchin, 1998). Such an approach turns the acquisition of understanding away from a focus on the external world of rules, concepts and exemplars, to the interior world of how accountants, as people, arrive at an understanding that is consistently ethical. To achieve this, the article relies on Lonergan's seminal (1957) examination of the internal processes of decision-making and the critical roles played by developing skills in data retrieval and insight in the exercise of judgment.

Key words: Accountants; Ethics; Governance; Lonergan; Kohlberg; Model, holistic; Professions.

There can be little doubt that the application of ethical decision-making to the practice of accounting has become a topic that confronts the profession on almost a daily basis. It is a subject no longer confined to academic journals or even the mainstream business press. It has become a broader social issue that potentially threatens the professional reputation of accountants across the world. When asked about their reactions to the accounting conduct of entities such as Enron, most graduate accounting students respond with little or no surprise. Do they believe such scenarios will happen again? Their overwhelming response to the question makes it almost comically naive. The perception that accountants are unable effectively to address the problem has been exacerbated by the increasing use of language designed to sanitize ethical issues rather than confront them. For example, with terms such as 'earnings management' or 'aggressive accounting' now in common usage, it is little wonder that communities have become cynical about the accounting profession's ability to meet its social obligations effectively.

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Most accountants do not realize the extent to which their practice has an ethical dimension—until it is perhaps too late to respond effectively. Their failure to recognize this multidimensional nature of accounting arises often because they lack the knowledge and skills to analyse issues effectively. Poor investigative technique means that when they are confronted with ethical problems they are often unable to resolve issues in a manner consistent with their own professional values and their community's expectations. They simply do not know enough to make a 'good' decision. Frequently the values that influence their choices remain unstated and unrecognized, lacking any real introspection. As a result the discipline's professional status remains under continued scrutiny. Evidence of this may be found in the growing external controls placed on accountants by governments and regulatory bodies throughout the world (e.g., the introduction of both the Sarbanes-Oxley Act and U.S. Public Company Accounting Oversight Board represent renewed attempts to regulate the independence of American auditors).

Such external regulatory control is contrary to the very concept of professionalism. Functionalist studies based on conventional trait theories suggest that those disciplinary groups that are often regarded as the 'professions' share certain occupational characteristics (see, e.g., Greenwood, 1957). These studies cite 'specialized knowledge' as the primary identifying characteristic of all professional groups (Millerson, 1964). Greenwood's seminal paper (1957) suggests that an occupation's social recognition as a profession is contingent not only on the set of technical skills demanded by its community, but also on that skill set being based upon the mastery of a body of more abstract, theoretical concepts. The 'layman's comparative ignorance' of the underlying concepts ensures society's reliance on the professional's expertise and thus confirms that the professional has a 'monopoly of judgment'.

It is through the exercising of judgment in the application of specialized knowledge that a discipline establishes itself as a profession. The community's sanction of a discipline as a 'profession' represents the social acknowledgment that it has exercised its judgment in a manner in keeping with its social obligations. With the societal power that results from the knowledge held by professions, such as accountants, there is always the threat that their 'monopoly can be abused [and that their] powers and privileges can be used to protect vested interests against the public' (Greenwood, 1957, p. 56). Emmet (1966) suggests that a major precursor to enhanced professional recognition is society's belief that practitioners have chosen to act in a manner beneficial to the community in which they exist. If accountants are to maintain or enhance their professional identity, the broader community needs to perceive that the discipline has made choices that are aligned with the social obligations expected of it (Buckley, 1978). One line of research enquiry has examined different occupations in various social settings and at various points in time and placed them along a continuum in terms of their perceived level of professional recognition (Dingwall and Lewis, 1983). The scores generated, 'occupational prestige scales', measure an occupation's status, legitimacy and recognition within the broad social community in which it operates (Daniel, 1983). Conceptually these scales have long been regarded as an important measure within the social stratification literature (see, e.g., Warner, 1960; Bendix and Lipset, 1966). The scales provide an effective proxy for (or are strongly indicative of) a community's perception of a vocation's place along the occupational continuum. The higher the ranking, the greater the prestige of the vocation. The highest rankings are given to those professional vocations with the greatest social acceptance of the application of that profession's knowledge base and judgment.

Occupational prestige scales studies confirm that those vocations that inherently rely upon the individual judgment of their practitioners in the application of often esoteric knowledge sets are consistently ranked as most prestigious in virtually all cultural and social settings (Treiman, 1977). For example, the professions of law (particularly the judiciary) and medicine (particularly surgeons or those in specialized areas) are consistently placed at the upper end of these prestige scales.

As social perception is the test of an occupation's societal value and such perceptions are subject to change, so the status of various vocational groups at various points in time will change also (Parsons, 1964; Abbott, 1988). An interesting observation is the fall in prestige ranking of the occupation of bank managers. Once regarded as a prestigious position, the bank manager has suffered a measurable loss of prestige. One explanation given for this is that as the banking industry centralized its decision-making in the late twentieth century this effectively robbed its branch management of any specific role requiring expertise and the exercise of judgment. Those bank staff who interface with the community do so as sales people carrying out bank policy.

Historically the occupation of professional accountant (as distinguished from a bookkeeper or clerk) has consistently earned a high level of prestige in many societies (Treiman, 1977). However, the accountant (while not quite in the position of bank managers) is now countenancing an increasingly regulated environment that puts pressure on individual practitioners to conform to a predetermined model of acceptable practice. This could be perceived to put potential limitations on an accountant's ability to exercise professional judgment. For example, in Australia, approved accounting standards are now part of the *Corporations Act*, international accounting standards have been imposed rather than discussed and developed by local accountants, and the government-appointed Financial Reporting Council has been given the role of monitoring the ethics of the accounting profession. Accountants still exercise a large degree of judgment in the choice of accounting policies, but the public perception of increased regulation might increasingly reflect a view that they do not. The changes in the regulation of accounting disclosure and accounting practice in Australia and the United States are indicative of a trend that poses a significant threat to the prestige and status of accountancy worldwide.

The governing councils of bodies, such as The American Institute of Certified Public Accountants, CPA Australia, The Institute of Chartered Accountants in Australia, and The Institute of Chartered Accountants in England and Wales obviously understand that their professional status is contingent on an observable response by those professional bodies (as a whole) to criticism of socially questionable decisions made by individual accountants. Historically, across virtually all social settings, the reaction of accounting's representative bodies appears to have been threefold. First, they have issued codes of professional conduct as a form of guidance to their membership. Second, they have tried to ensure that those individuals wishing to become professional accountants undertake some course of study that acquaints them with their codes. Finally, they have instituted disciplinary procedures to deal with complaints about the conduct of their membership.

The approach taken by the accounting profession worldwide has logical and intuitive merit. However, the current post-Enron environment has led many observers to question how effective such a course of action has been and will be in the future. This article is based on the view that the accounting profession worldwide has often attempted to prescribe solutions to specific ethical problems and that such a rule-based approach fails to provide its members with a basis from which truly they may incorporate ethics into their professional decision-making practices. It outlines a hierarchal method of decision-making based on the work of Bernard Lonergan (1957) that could be used by the professional accounting bodies to remedy this situation. The approach taken turns the acquisition of understanding away from a focus on the external world of rules, concepts and exemplars, to the interior world of how accountants, as people, arrive at a willingness to act on a conviction that they have sufficient understanding and judgment to justify decisions taken, such as an audit opinion, that is consistently ethical. It introduces the term 'professional governance' as a description of these internal decision-making processes and applies it to the practice of accounting.

ETHICS, MORALITY AND CODES OF PROFESSIONAL CONDUCT

Hines (1990) correctly observes that financial reports have gone beyond mere technical communication and now play a crucial role in the 'construction' of the business entity for all stakeholders. This means that accounting can never be a 'neutral' or 'independent' activity and that the onus for deciding on the relevance and reliability of disclosed financial information is now focused on the qualities possessed by those who prepare it and attest to it. We live increasingly in societies that have adopted a system of democratic capitalism in which many businesses, some very large, will always fail, bearing out Schumpeter's description of capitalism as a process of 'creative destruction' (1942, p. 83). This is tolerated because, overall, the system generates benefits that are widely distributed. What the societies who operate the system appear to becoming is increasingly agitated about the unexpected but increasingly regular failures of companies that have occurred in the United States, Australia and the United Kingdom. These were unexpected, in the main, because the information that the markets rely on as a significant input to decision-making, namely audited financial statements, were subsequently shown to have been doctored to create artificially inflated profits and asset values. These occurred despite the increasing regulation that financial statements and auditors have been subject to over the last century. We have witnessed corporate failures of staggering proportions in which auditors provided clean audit reports to financial statements that complied with the myriad accounting standards promulgated by national accounting professions and government regulators but which failed to provide reliable information about the financial performance and position of those companies.

We need to ask the question: what role was played in informing, or misinforming markets by the accountants who prepared the financial reports and auditors who attested to them? Accountants have the job of exercising judgment about which option to implement from the growing smorgasbord of regulated accounting standards. Pressure to be creative within the options allows accountants to generate financial statements fully compliant with the letter of existing accounting standards but which fail to indicate the actual changes in economic fortunes experienced (see Clarke *et al.*, 1997). Auditors then provided companies with a clean audit report based on compliance with regulations rather than serviceability to potential users. Once a company has failed, the belief system based on accounting standards that supported the company through its financial reports is cast aside for a belief system based on evidence about the market value of the assets in relation to the liabilities. It is in the light of this latter system that auditors settle large damages suits and company accountants are indicted on criminal offences. In the harsh spotlight of cross-examination, compliance with the letter of accounting standards is rarely seen as a sufficient defence against negligence in preparing or attesting to published financial statements (as in the U.S. Continental Vending case).

In the United States between 1997 and 2000, prior to the collapse of Enron, 700 companies were required to restate reported earnings by the Securities and Exchange Commission (Surowiecki, 2004, p. 128). After Enron, U.S. audit firms came under intense scrutiny. The conflict between auditing and consulting, working for the company you once audited, competition through low audit fees offset by larger consulting fees, being hired and fired by the client, and then being able to cite client confidentiality when client problems were exposed, all created potential if not actual conflicts for auditors. All the leading audit firms made out-of-court settlements, so the issue of Arthur Andersen and Enron was not an isolated case. As Clarke *et al.* state: 'Perversely, the greater the regulation the less reliable accounting has become, and a fatal attrition of accountants' judgment has become more of a reality than a possibility' (1997, p. 238).

The essence of professional status is the sanction provided by society to accountants for the exercise of judgment in the public interest. Attrition in the role of judgment exercised by accountants, and importantly in the perception of society that observes the social fallout of accounting choices when companies fail unexpectedly, has the potential to threaten the professional identity of a discipline that asserts that its expertise and societal value is contingent on the individual accountant's principles of objectivity, neutrality and independence. Accountants are not well known as whistleblowers,[1] yet exercising expected professional judgment and applying a professional code of ethics is increasingly likely to present accountants with a moral dilemma. Do they protect their personal interests and those of the executives with whom they work, rationalizing away the practices that they adopt (Anand *et al.*, Ashforth, 2004), or do they protect their professional status?

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[1] Even Sherron Watkins at Enron did not blow the whistle as her memo outlining Enron's problems was an internal memo sent anonymously to chairman Kenneth Lay (Ackman, 2002).

In response to criticism generated mainly since the collapse of Enron, the professional accounting bodies have moved to focus more on ethics. The International Federation of Accountants (IFAC) in 2005 issued a *Code of Ethics for Professional Accountants* (IFAC, 2005) that has been adopted by member association of IFAC (e.g., see APES 110, issued by the Accounting Professional and Ethical Standards Board in Australia in 2006). IFAC has also been busy initiating changes to the rules on independence and how accountants develop and maintain professional values and ethics (IFAC, 2006a, 2006b).

Much of this activity involving ethical codes may be seen as a reaction by accounting professions around the world to the increasing regulation of accounting and auditing practice. Paradoxically, the true and fair requirement of published financial statements is increasingly interpreted as compliance with the regulations rather than being grasped as an opportunity by the accounting professional to assert the superiority of its collective and individual professional judgment over a set of increasingly bewildering accounting rules, compliance with which we now know will mask the poor performance and financial position of some major companies.

A significant question to ask is whether rules and regulations are sufficient to protect those who depend on financial statements as an indication of corporate economic performance. The answer is that rules provide the necessary condition for effective accounting practice, but not sufficient conditions. Regulations are designed to remedy old problems not anticipate new ones. They apply to the general situation rather than the myriad specific situations confronting accountants in practice. The accountant needs to understand the intention of the rule or regulation and to interpret it in that light. All rules require interpretation to enable them to apply to specific situations and it is in the interpretation where ethical principles come into play to indicate what the 'reasonable' person would do in the specific situation and how an impartial observer would view what was done (Cheffers and Pakaluk, 2005, pp. 29–36). To interpret rules effectively for the benefit of all those affected requires the accountant to have developed sound ethical judgment as well as sound technical skills. This applies equally to rules of ethics and to rules of disclosure and measurement.

Focusing on yet another set of rules (ethical codes) is unlikely, by itself, to solve the problem. To be effective, the code of ethics needs to be reinforced by the accounting profession developing effective strategies that oblige its members to pay attention to and translate fundamental ethical principles into the choices they make in their accounting practices. Without undertaking such educational endeavours with its members, the professional accounting bodies will continue to attract criticism when the next spate of company collapses occurs.

Dunne (2004) suggests that 'morality' reflects the everyday decisions evident in individual and group behaviour, whereas 'ethics' is a theory-based reflection on

FIGURE 1

INTERNATIONAL FEDERATION OF ACCOUNTANTS FUNDAMENTAL PRINCIPLES

Distinguishing mark of accounting profession

Public interest

Fundamental principles

- Integrity
- Objectivity
- Professional competence and due care
- Confidentiality
- Professional behaviour

that morality. Ghoshal (2005) points out that the study of morality and ethics cannot be separated from the study of intentionality and choice. Just as accountants use theory-based reflection to explain and improve technical accounting procedure, they also need theory-based reflection on the choices available to them to explain and justify the choices inherent in the practice of their profession.

In countries with an accounting profession, the professional accounting bodies have produced some type of formalized code that prescribes the professional conduct expected from their membership. Recently, there has been a convergence of professional codes of ethics as members of IFAC adopt that body's *Code of Ethics* (see Figure 1 for a list of IFAC's fundamental principles). In reality, with little or no education in philosophy, accountants generally appear unaware of the philosophical origins of these terms or the ethical theories on which they are based and thus often perceive them as a series of 'motherhood' statements.

Leung and Cooper (1995) assessed the effectiveness of professional codes of ethics and found that many Australian accountants believed that their peers had little knowledge of the code's content. They also suggested that there was uncertainty among accountants about how such codes could be used in dealing with ethical issues, and how effectively the code's principles were enforced. Their research found that most accountants tended to consult their superiors when determining the appropriate response to ethical matters. This reluctance by accountants to rely on their own abilities to resolve ethical issues would seem to indicate that many felt deficient in their own ethical reasoning capabilities.

IFAC's code of ethics appears to address such issues by providing a framework for addressing conflicts of interest. The framework uses a threats and safeguards approach, outlining potential threats and appropriate safeguards. One criticism of such an approach is that instead of painting ethics as a positive, valuable contribution to all decision-making, it is cast as a negative hurdle requirement that first needs to be recognized before it can be addressed (Accounting Professional and Ethical Standards Board, APES 110, 2006). When accountants are unused to considering

FIGURE 2

STAGES OF MORAL DEVELOPMENT AND MORAL REASONING

Level	Focus	Stage	Attributes
3. Post-conventional	Universal care for others	6	Personal principle-driven action
		5	Community standards prevail
2. Conventional	Community duty	4	Law and rule follower
		3	Pleasing others
1. Pre-conventional	Self-centred	2	Self-interest
		1	Avoids punishment

Source: Dellaportas *et al.* (2005, p. 44).

ethical aspects with every decision they are likely to miss the ethical significance of many decisions that are made.

Many studies of ethical reasoning have been conducted over the last thirty years. This research often tests a model developed by Kohlberg (1969) and, subsequently, Rest *et al.* (1999) using an approach developed by Piaget (1972). These studies assert that moral reasoning develops sequentially. As a person develops cognitively, he or she advance through three stages: from 'pre-conventional' moral reasoning where the focus is on pleasing themselves or avoiding punishment, to a 'conventional' level, where the focus moves towards an understanding of the importance of ethical reasoning to social relations with more reliance placed on following the rules of law or pleasing others. The final level is 'post-conventional', when one starts to internalize a set of ethical principles, and the focus in ethical reasoning moves to an appreciation of community standards and ultimately is motivated by a well-developed set of ethical principles (Figure 2).

North American research on the ethical reasoning capabilities of accountants using this model produced findings that are no more reassuring than the Leung and Cooper (1995) survey. Armstrong (1987) found that the vast majority of moral reasoning by accountants did not progress beyond the conventional level and Ponemon (1990, 1992) discovered that accountants' moral reasoning appeared to be inversely related to their seniority within an organization, with ethical reasoning levels declining at more senior levels. Ponemon ascribed this finding to the promotion of staff who shared lower ethical reasoning levels with senior management, with staff with higher ethical reasoning levels leaving the firm. Ponemon and Gabhart (1993) found that Canadian accountants appeared to be conventional rule-based moral reasoners with the majority focusing purely on compliance with accounting and auditing regulation.

The findings of this research have, however, been subjected to criticism. As with Piaget's (1972) approach, Kohlberg's invariant sequential model has been questioned. Riegel (1973) suggested that people could operate simultaneously at different levels of cognition, switching back and forth between them. If this were the case then Kohlberg's stages would become descriptors of styles of mental activity rather than stages of cognitive development. Gilligan (1982) suggests the results gained from tests of ethical reasoning may sometimes be more a function of the definition of ethics used than an indicator of any deficiency or excess in moral reasoning. Thus accountants' scores in the Kohlberg tests may be more an indicator of the alignment of the participants with the notion of ethics applied than an indicator of level or stage of ethical reasoning used.

Irrespective of such criticism, the North American and Australian studies suggest that accountants operate generally at the lower conventional level of Kohlberg's model while the community expectation of an accounting professional is more likely to be at the higher post-conventional level. The size of this lacuna poses a potential problem for the professional status of accountants, as the collapse of the auditing firm Arthur Andersen vividly indicates. Once the shredding of documents by Andersen staff became public information clients began to desert the firm, yet senior partners were in denial that the situation was out of control (Brewster, 2003, pp. 234–50).

To ensure the maintenance of professional recognition, individual accountants need to take responsibility for their own actions and apply processes that they have internalized to truly meet societal expectations. Rather than relying essentially on an imposed set of external regulations, guidelines and exemplars, the professional accountant's decisions, while reflecting community expectations, will of necessity be derived from each practitioner's individual internalized decision-making processes. If the professional bodies are serious about enhancing the ethical basis of their members' decision-making processes then they will have to provide members with some appropriate mechanisms for developing these internal processes.

A PROFESSIONAL GOVERNANCE APPROACH

Thinking of morality and ethics entails thinking of the distinction between good and evil, right and wrong. However, good itself has various meanings. Firstly there are particular goods driven by personal desires and wants. Secondly there is the good of order that tempers our personal desires when these clash with the desires of others and which lead to the development of social structures and institutions that provide for communal living and comprise the existing social order. The social structures involve linkages between the internal wants, desires and expectations of people and the external events through which they are expressed (Melchin, 1998, pp. 42–50). Melchin uses a purchase transaction to explain the ubiquity of social structures and the moral obligations that are implied by them. Thus in establishing a business relationship, negotiating a deal, making a final contract and setting the condition for a repeat transaction, there is a reciprocal exchange of shared meaning that allows the transaction to move to its completion in an atmosphere of mutual trust. He suggests that such structures involve an internal logic and morality that will of necessity be followed if the structure is to remain viable for future transactions to occur. Social structures inherently place obligations, of which the most important are moral ones, on participants. Compliance with these inherent moral obligations enables people to make use of existing social structures without damaging the integrity and future utility of those structures.

Such structures form part of what we could call the common good, or the good of communities as a whole. The whole is made up of the sum of the parts, but it is not the good of the parts in isolation added together, but in relation to each other, that comprise a functioning whole (Stebbins, 1997, p. 6). Maintaining and developing the common good involves focusing on the relationships between the various parts that help communities flourish.

The relationship between the accountant, the client, third-party users of accounting information, and society is an example of a social structure. As with others, it is a structure based on a sequence of activities and mutual trust, and therefore has its own internal moral logic. For example, third parties and society trust the accountant to prepare financial statements that are positively correlated with actual events, and they trust the auditor's opinion as confirmation of this correlation. If the moral logic of the social structure that exists in accounting relationships remains hidden from the individual accountant's consciousness as he or she chooses between competing accounting policies, then the desirable ethical principles specified in the code of professional ethics issued by accounting bodies will have little impact as practical guides to action. When trust in accounting activities, such as auditing, breaks down, as with the demise of Enron and Arthur Andersen, the entire accounting social structure is under threat.

To understand more fully the relationship between ethics and decision-making we need to understand better the internal process of decision-making that an accountant undergoes when making accounting policy choices. Lonergan (1957, p. 7) examined the internal process of decision-making and suggested that effective, ethical decision-making was 'attentive, intelligent, reasonable, and responsible'. Further, he believed that ethical outcomes could be consistently achieved by mindfully applying the senses, intelligence, judgment and values in deciding what was the appropriate action to take in any situation. (Note that these are all aspects internal to the decision-maker rather than a set of externally imposed, prescriptive rules.)

For Lonergan, this framework gives meaning to the ethical choices that people make. Applying the framework effectively, an individual's behaviour will reflect an understanding of the interconnectedness between that behaviour and the rest of society. Understanding that the accountant's behaviour affects the common good, behaviour that is cognisant of and is in concert with meanings and values shared with the rest of society is self-transcending. Such behaviour is consistent with Section 100.1 of the APES *Code of Ethics* which states that accountants have a higher calling than merely earning an income because '(a) distinguishing mark of the accountancy profession is its acceptance of the responsibility to act in the public interest' (APES 110, 2006, p. 4).

We suggest that the professional accounting bodies need to do more to encourage ethical decision-making by accountants and help to move them beyond Kohlberg's conventional style of ethical reasoning towards a more transcendent, post-conventional style. One way this can be achieved is by encouraging members to employ a model of ethical thinking such as that proposed by Lonergan (1957).

The term 'professional governance' has been applied here to indicate a process for guiding accountants in their vocational deliberations using the method outlined by Lonergan. HIH Royal Commissioner Mr Justice Owen (2003, pp. 20–1) states that governance 'is the framework of rules, relationships, systems and processes within and by which authority is exercised'. For the accountant this is represented in each social location by a framework of relevant legislation, generally accepted accounting principles, and a code of professional conduct. However, Owen goes further by saying governance 'also includes the practices by which that authority is effected' (2003, pp. 20–1). The focus of this article is on the decision-making practices, beyond accounting standards and codes of conduct, through which accountants' authority may be 'effected'. Such a focus is important because it is these internal decision-making processes (that will always remain beyond the control of prescriptive external rules) that will ultimately determine the ongoing professional status of accountants. Accounting bodies will never be able to establish rules that will lead to 'good' decisions. Good decisions will simply occur more often if the majority of professional accountants have appropriated 'good' decision-making methods for themselves and understand the transcendent nature of 'good' decisions.

The professional governance model that we propose can be differentiated from those models most often cited by accounting bodies in that it features two essentially distinct characteristics. First, it focuses on the person making the decision (the subject) and not the decision itself (the object). Second, it provides a map of the activities and approaches needed by a subject both to gain insight to what is or has happened and fully understand it, and to tap into the shared meaning and values within and between communities to enable them to 'know' what is required to make an ethical decision, focusing on the key elements that give the direction and control arising from a person's powers of enquiry.

TOWARDS A MODEL OF PROFESSIONAL GOVERNANCE: THE 'QUESTIONING PROFESSIONAL'

Melchin (1998, pp. 17–27) provides an analogy of a person relaxing on a beach who hears a cry for help. The typical reaction is to change from a state of calm to one of alertness, followed by a state of responsibility to enquire about the source of the cry and respond to it in some way so as to express a concern for a fellow human being. This dynamism of concern for others is the source of our moral action and the foundation of ethics. (The rules handed down in codes of conduct and accounting standards similarly arose because accounting bodies and regulators were aroused by the dynamic of responsibility to others in the community.) If the cry for help comes from somebody in difficulty, our reaction will depend upon answering—often at great speed—a series of questions. Is it a cry for help? Where is it coming from? How do I determine the reality of the situation? What do I do now? Our action will depend upon a number of conditions: whether I am near the person; whether others are quicker to help than me. Once I have determined what can be done, I need to ask myself whether I will actually do it? (This last question is complex and involves an evocation of the values that are important to you.) There is thus a basic interior grounding to all moral action. Importantly, note that the model outlined above is based on questioning. Questions form the initial source of all moral action.[2]

Some may suggest the above analogy does not represent the type of decisions often countenanced by accountants and that ethical rules need to be contingent on the settings, intentions or consequences with which the practitioners are faced. Lonergan would deny this view as his approach focuses on the internal universal process of decision-making which makes the need to distinguish between settings or the adoption of, for instance, a teleological or deontological perspective (see, e.g., Grace and Cohen, 2005, pp. 10–15, or De George, 2006, p. 51) of secondary importance.

The *subject* (the accountant making the decision) is the focal point rather than the decision or its possible outcomes. Accounting decisions involve choice and therefore elements of moral reasoning (Ghoshal, 2005). If this is the case then they involve the same internal processes that are associated with the decisions made within the above scenario. The *object* (the decision), irrespective of its context, does not change the fundamentals of the process. The desire to 'know' manifests itself in a conscious drive to engage with the task of understanding. The basis for all good decision-making lies in understanding. Good understanding comes from good enquiry and observation. Therefore the starting point for our basic model of professional governance is to ask relevant questions.

The long-established professions of medicine and law are based on entrenched practices of systematic enquiry. The pronouncements of the medical professional or a member of the judiciary are derived through exhaustive questioning before there is an application of any specialized, medical or legal knowledge. For example, the medical profession would strongly advise that a doctor take no action, prescribe no medication, embark on no form of treatment without having accumulated enough evidence, insight and therefore knowledge about the reality of a patient's condition to know what action to take that will satisfy their peers. When medical practitioners err it is usually as a result of their failure to diagnose a patient's condition correctly and the community is quick to criticize them for their errors of judgment. Accountants are in a similar situation. To adhere to good governance practices the accountant needs to become an effective 'questioning professional' when making decisions.

The questioning professional makes sense of the social structures within which he or she practises, needing to comprehend as much as possible about what is going on before exercising his or her discretion. This requires the questioning professional to be open to all possibilities and scenarios. The questioning system of enquiry is one with which we are all familiar from the operation of courts, commissions of enquiry, and even the media's questioning of people in powerful positions. Systematic enquiry has been traditionally the basis for the application of all professional functions, be they medical, legal or accounting. The desire for understanding through systematic enquiry is the source of a profession's judgment and therefore its accountability.

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[2] Brave people appear to act instinctively when saving others and often say they did not have time to think, but this is probably a learned response based on questioning at some earlier time.

For example, in recent years the medical profession (see American College of Physicians, Australian Medical Association and The British Medical Association) has strongly endorsed 'evidence-based medicine', which promotes an integrated decision-making process founded on identifying, collecting and collating relevant research evidence to ascertain the validity of suggested medical procedures. The method requires a systematic review of literature and applies the results to patient care. It promotes the view that medical practitioners will make more effective medical decisions if they have access to all the relevant research data (as opposed to what the drug companies would prefer to promote) before they can evaluate them in a systematic fashion.

While ethical decision-making models suggested for accountants such as that developed by Langenderfer and Rockness (1990), Nash's twelve-question model (1981) or Rion's practical model (1990) are based on a 'questioning' structure, the accounting professions in the United Kingdom, North America and Australia have usually applied them using a prescriptive 'conventional' check-list approach, rather than as a means of facilitating a 'post-conventional' transcendent analysis of the process of making a decision by individual professionals. The focus of this approach has therefore been on the decision itself rather than the process used by the decision-maker. The accounting bodies have acknowledged the need to ask questions prior to arriving at any decision, but by the adoption of a prescriptive checklist approach may have failed to equip their membership with the requisite skills both to ask questions and to interpret their responses. Such an approach should be seen as a first step in educating accountants about how they approach ethical issues rather than as an all-encompassing solution.

The degree to which a professional association encourages and promotes its membership's ability to ask effective questions provides a good indicator of its authenticity and moral strength. Professional accounting associations across the globe will increasingly be held accountable for how effectively they equip their membership with the internal skills associated with enquiry. Historically, the legal and medical professions have achieved this task to the satisfaction of the communities that they serve. Accountants generally have not. The published contents (and pedagogies) employed in professional development courses offered by the accounting associations in the United Kingdom, North America or Australia suggest that there is little focus on developing research skills in practitioners. Yet, like doctors or lawyers, it is the accountant's judgment and ability to make 'good' decisions that are the features of their vocation that distinguish them as a professional group.

THE POWER OF EFFECTIVE QUESTIONING: A DYNAMIC STRUCTURE

Questions by their nature seek answers, which generally lead to further questions. Hence the utility of a list of static, predetermined questions is limited. Alternatively, certain factors often stop effective questioning. These relate mainly to the perceptions of individual accountants about themselves. Factors that stop questioning include: fear, lack of knowledge or interest, not wishing to disturb group harmony, not wishing to be seen to be different, past criticism, intimidation and pressure to conform. Accountants are rarely observed as whistleblowers when unethical corporate conduct is discovered, indicating that they succumb to pressure by submission to, or escaping from it. The accounting profession, as a group, needs its members to adopt a questioning strategy to counteract the potential impact on the profession's reputation of the failure by individual accountants to ask the right questions at the right time. Professional bodies need to ensure that the value of enquiry (as a basis for judgment) in individual accountants is not overlooked. In addition to supplying and prescribing answers to problems often countenanced by practitioners, the profession may need to employ strategies to allow individual accountants to focus on developing their powers of questioning.

In his seminal work, *Insight*, Lonergan (1957, pp. 8–9) analysed how scientists went about the process of discovery and identified the basic components of enquiry. He realized that this specialized method of enquiry could be adapted as a generalized empirical method of decision-making, based on the data of consciousness (p. 96). The method focuses on four operational norms: 'be attentive', 'be intelligent', 'be reasonable' and 'be responsible' leading to a conscious experience of what we are doing when deciding and acting.

Lonergan's method (see Figure 3) provides a practical model for accountants to reflect upon their individual approaches to decision-making. It can be used to focus the accountant's attention on the processes inherent in forming an opinion, yet it is not overly complex. The method provides a basic template from which the practitioner can gain insight to the internal structure of enquiry that guides their professional judgment.

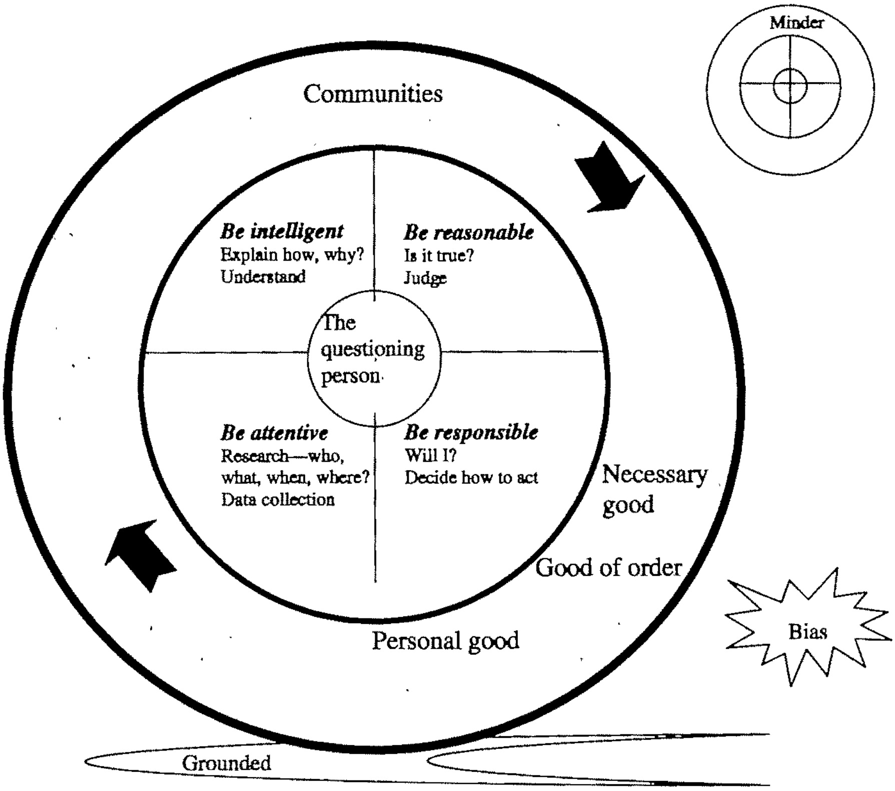
To apply Lonergan's method accountants need to be aware of the relationship between their own internal dynamic model of questioning (that is invisible to others), and the public manifestation of that questioning. Rather than a checklist, the model provides a means for controlling the accountant's thinking and therefore managing professional behaviour. The model outlined below provides a dynamic structure of questioning that, if applied consistently, generates an individual set of operations that can add value to an accountant's decision-making.

Figure 3 illustrates the basic model, showing the internal dynamics of this system of questioning, brought to consciousness, with the operating norms being the inputs, the questions being the process, the product being the result of the questioning and the answers sought being the output of the model. This model may be used by practitioners to reveal the questions associated with each operating norm providing classification for each question by the type and nature of answers it seeks. It thus provides accounting practitioners with a means of contemplating the integrity of the process by which they make professional decisions.

McPhail (2001, p. 280) asserts that accounting tends to dehumanize organizations through quantification of activities and relationships, and it diminishes the empathy of accountants with 'the other'. He contends that developing a concern for other people is a fundamental aspect of ethics and for continuance of a cohesive society.

FIGURE 3

A MODEL OF PERSONAL GOVERNANCE BASED ON THE INTERNAL DYNAMIC SYSTEM OF QUESTIONING



By attaching its cart to the corporate horse, the accounting profession has given priority to the interests of shareholders. With issues such as global warming appearing on the horizon, accountants are poorly placed to respond to the demands of 'the other' without bringing an ethical consideration of that other (both society and the environment) into a central, broad, positive role in its activities, rather than reducing it to a peripheral, narrowly defined, negative role.

Lonergan's model does this by highlighting the pivotal place of enquiry and questioning in the dynamics of professional decision-making. His approach is useful because it reveals all the key components of governance in relation to each other—such as values, operational roles and community interests.[3] It reflects the dynamic nature and structure of governance—the need to consider data, their interpretation, assess the reality of the situation, the need to deliberate and evaluate possible positions against the good of the community, the need to implement decisions in a way consistent with the social responsibilities entrusted to accountants, and lastly the need to monitor the action taken and the outcomes derived against the insights developed. The following sections outline and discuss the components of Lonergan's model.

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[3] We have used the word 'community' because researchers in domains other than business find the term 'stakeholder' troubling (see Stebbins, 1997; Grace and Cohen, 2005).

BEING ATTENTIVE

At the first level of Lonergan's method, there is a need to 'be attentive' to the process of enquiry. As a practising professional (as with the analogy employed by Melchin), an accountant concerned about the application of good decision-making processes will be cognisant that a series of questions are required to ascertain the reality of any situation. The nature, quality and appropriateness of this enquiry will determine the integrity of the foundations upon which the accountant will base any eventual judgments and actions. As with other professions, the enquiry will also provide the basis upon which professionals will be held accountable for those decisions.

Considered enquiry as to the 'who?', 'what?', 'when?' and 'where?' of a situation enables the accountant to collect the relevant data. The answering of such questions not only requires that the accountant be in touch with the world but ensures that this will be the case. These questions are indicative of a professional who is engaging in research. The product of being attentive is research, and the output of research is not fact but data. Research provides a starting point from which a decision may be constructed as opposed to an answer in its own right. Many observers draw no distinction between data and facts. Lonergan, however, is at pains to point out that fact is the output from data analysis, rather than an input to them. For example, the APES 110, *Code of Ethics for Professional Accountants* (2006) outlines a process to adopt in resolving conflicts in the application of fundamental principles which appears to be based on the AAA model of effective decision-making (AAA, 1990) also published in Joint Guidance Note GN1 for members in business (see CPA Australia and ICAA, 2002). These models of ethical decision-making (see Figure 4) were intended to 'provide decision-makers with a framework to systematically resolve ethical problems' (CPA Australia and ICAA, 2002).

It can be inferred from the list order, with facts coming first, that determining the facts is akin to data collection, whereas, for Lonergan, understanding the 'facts' requires decision-makers to apply their intelligence to reach an understanding of those data and pass judgment on their veracity.

When applying Lonergan's model, unlike when applying the code of professional ethics, terms such as 'objectivity', 'independence' and 'neutrality' become operationalized through the implementation of good evidence collecting and evaluation practices. The outputs of quality research are data that display these same characteristics. The collection of data that are not objective, independent and neutral, caused by inadequate or sloppy research techniques, will lead to partial or even faulty explanations and often the acceptance of one explanation above others that does not provide insight. This in turn can lead to judgments that

FIGURE 4

AAA MODEL OF ETHICAL DECISION-MAKING

Code of Ethics for Professional Accountants	Joint Guidance Note 1
Relevant facts	Determine the facts
Ethical issues involved	List the significant stakeholders and define the ethical issues
Fundamental principles related to the matter in question	Identify the applicable fundamental principles, and any other rules or values
Established internal procedures	
Alternative courses of action	Specify the alternative courses of action
	Compare the alternatives and see if a clear decision emerges
Weigh the consequences of each alternative course of action	Assess the consequences of each alternative course of action
Take course of action consistent with the fundamental principles	Make a decision

Source: APESB (2006) and CPA Australia and ICAA (2002).

are not objective, independent and neutral and therefore poor outcomes for both the individual accountant and the profession as a whole.

As criticism of decisions made by individual accountants has a negative impact upon the profession as a group, the peer review of evidence-collecting strategies becomes an essential issue. The more accountants (as a professional group) are educated in good research (data collection) practices the more accountable those who produce and attest to those data become. This line of argument suggests that it is not solely the role of accounting firms to train accountants in basic evidence-collecting skills. The professional bodies also have a role to ensure that their entire membership has the skills needed to assess the nature and quality of evidence collected. This might require professional bodies to insist that universities not only more fully integrate research skills into their degrees, but also provide for members to continue to develop their evidence-collecting skills through, for instance, the creation of research support networks. A greater level of interaction between research-trained academic accountants and practising accountants could be facilitated through such networks.

The legal profession has for a long time based much of its search for greater certainty when passing judgment on accused persons on documentary and other evidence provided by witnesses and experts (Banks, 1999; Freckleton and Selby, 2005; Martin, 2005). Lately the medical profession, in response to growing public awareness of the limitations of doctor recommendations (Guyatt and Rennie, 2002; Evans *et al.*, 2006), has placed particular emphasis on enhancing practitioners' ability to gather evidence and understand it. These vocational groups can easily be characterized as 'questioning professionals'. In legal education, 'moot courts' are often used to develop and hone the legal student's questioning skills in litigation training. The interaction of students, academics and legal practitioners allows students to see why questioning skills are important to the professional lawyer. Similarly, in the early years of medical education, supervised patient visits or ward rounds are continually used to enable senior practitioners both to observe and to assist junior members of their profession with the development of evidence-collecting and diagnostic proficiency. Ward rounds allow recent graduates the opportunity to practise asking questions of nursing staff, specialist doctors and, importantly, their patients. This regular peer-driven process allows both the junior and senior doctors the opportunity to acquire and maintain the necessary skills of enquiry.

The development of both evidence-collecting techniques and the skills in understanding the significance of the evidence seems to be an integral component of both a legal and a medical education. Evidence collecting, its evaluation, and professional practice seem tightly intertwined in both these professions. Professorial appointments at universities often remain in practice—and some are required to do so—and practitioners often publish in academic journals. This does not seem to be the case in accounting. While academic accountants may possess an appreciation of research methods, data collection and evaluation (usually gained through enrolment in highly selective research and doctorial programs), the curriculums and pedagogies of both undergraduate and professional development programs offered to accountants indicate that practitioners probably do not. Thus the first step in the development of professional governance by the accounting profession will require the implementation of strategies to facilitate the improvement of the research skills of their membership. It would be beneficial to the development of accounting judgment for this to begin at the undergraduate level and be continued throughout the practitioner's ongoing professional education.

BEING INTELLIGENT

At the second level, the accountant needs to explore those data by applying their intelligence and experience to them so as to determine 'what is going on' and 'why'. To 'be intelligent' requires the professional accountant to recognize that data need to be interpreted. This interpretation may provide many opportunities and possibilities to develop true insights into the scenario under scrutiny. Insight is the phenomenon experienced when a person puts *order* into data, when they grasp their *intelligibility*, and from which they can *explain* something. All insights are personal and solely within the capacity of that person to use. Lonergan (1957) suggests insight is the prime source of personal power as it energises and enlightens. It is useful to distinguish insight from seeing. All that is needed to see something is an eye, and seeing is immediate, but often unconscious. Even a blind person can develop insights, but they often take time and effort to develop.

Just as a doctor interprets a patient's symptoms, the results of tests, X-rays and ECG scans, the practising accountant develops insights that link and integrate relevant data before generating an understanding of a situation that requires a decision. The doctor's or the accountant's interpretation of those data may develop into one or more, perhaps competing, insights as a result of the diagnostic process. These insights may take time to materialize, or they can occur in an instant. As with the medical practitioner, the professional accountant can assist the emergence of insight by being persistent with their questioning (perhaps revisiting and revising the types of questions identified in the preceding level of the method).[4]

It is here that experienced accountants and academic accountants can help the neophyte accountant. In days gone by trainee accountants were articled to a professional accountant who acted as a mentor and guide. The trainee's questions about understanding the evidence collected could be guided by the master accountant who would keep in mind the nature of the evidence collected, the kinds of understanding that were possible, and the limitations to that understanding.

The use of mentors in accounting education illustrates how an accounting trainee, after initially gathering data, can enrich them with insight, and grasp the unity they contain. Insights necessarily inform the decisions made by accountants with the new understanding they now have. This enables the accountant to defend his or her decisions more effectively. Insights allow the accountant to perceive an issue from the perspective of others and therefore understand the implications of any subsequent decision he or she may make.

Processes and methods are needed to ensure not only that insights occur but that they are thoroughly tested and evaluated, for they have the potential either to enlighten or to mislead. Just as the comprehensive collection of data does not provide an answer, insights created through the processing of those data, by their nature, are contestable declarations of fact and are therefore open to conjecture and, as a result, often revision. By applying their intelligence to derive insight and understanding, accountants will develop ideas and concepts that need to be explicitly communicated to others either verbally, in written form or via financial statements so that they can be tested by further questioning.

The accounting profession needs to take the lead in the development of a professional environment and culture that is conducive to the promotion of a more analytical approach to addressing accounting issues. Individuals cannot be prescribed a collective means of deriving insight from data, as there are no universally successful approaches to the transmission of the internal processes needed to do this. These are skills that best come from a mentor or peer-learning environment. The colleges of law and medical internships provide this type of interaction in the other professional disciplines that is absent in the case in accounting. When medical specialists and young interns return from 'ward rounds' they are encouraged to discuss with each other the insights that they have gained with regard to each patient. Conflicting opinions can be discussed. This is of particular benefit to younger, less experienced practitioners who are attempting to develop into effective, insightful professionals.

Although individual accounting firms may provide training for new firm members that addresses some of these issues, it is the profession itself that needs to facilitate the development of professional social structures through which accountants can interact and acquire these skills, much in way university research students do from fellow students and supervisors in forums such as academic conferences.

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[4] See Gawande (2002) for a fascinating analysis of medical expertise.

Professional accounting journals also provide an obvious venue for such interaction. The observable difference in focus between academic journals and professional publications in accounting appears significant when compared with the journals of other professions. The line between professional journals and academic journals in accounting has never been so pronounced. References to any current research in accounting, its results and its methodologies, are rarely included within the professional journals. This is not the case in other professions. If accounting journals are to maintain a role as a major channel of communication between the profession and the individual accountant, then they will need to evolve from being primarily a means of disseminating the changes in the external regulatory frameworks faced by accountants to become a forum for debate and the exchange of ideas fundamental to the domain of professional accounting. The establishment of any real-time forum (either physical or virtual) facilitated through the creation of research support networks and the publication and distribution of 'questioning' professional journals would provide the opportunity to further the development of the internal decision-making processes of accountants.

BEING REASONABLE

At the third level we need to apply reason, and ask whether our insights are true or correct. To arrive at a confident response, accountants need to test their insight by asking relevant questions of the data. If an insight stands invulnerable against all questions, it becomes a judgment of fact or truth. The process of forming a judgment may direct an accountant's attention back to gathering more data so as to seek greater understanding of the situation, or propel the accountant forward to the final element of the model.

Just as members of a country's judiciary apply their insights to the materials and evidence presented in a court of law, accountants need to identify which of the accounting possibilities available to them best represents the reality of the situation, and which of the likely explanations indicates the truth, as they believe it.[5] As with an independent and objective legal system, the process needs to be similarly open and thus provide accountability and consistency.

With a properly considered judgment based on sufficient data and considered insight, the practitioner is in a position to provide a definitive response and may therefore exercise publicly powers of assent. As with a judge's determination in a court of law as to the guilt or innocence of a defendant,[6] the accounting practitioner may be required to specify a 'balance of probability' that any single explanation represents the underlying truth of a given situation, simultaneously declaring any attendant risks. Not all judgments made by accountants may be given with the confidence of 'beyond reasonable doubt' so questioning professionals, by 'being reasonable', will need to determine whether their understanding can be classified as true or only highly probable. Accountants and auditors do not have the luxury of providing probabilistic measures of financial performance and position, hence the need to exercise judgment in contentious areas on the basis of full information and after careful analysis.

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[5] We are not saying that accountants should be like judges. Accounting problems are obviously quite different from legal problems. Our concern here is that the approach employed by the judge is also appropriate for accountants.

[6] Where there is a jury, the judge will explain the law applicable in the case, how the jury should approach its assessment of the evidence, the main issues the jury will need to decide, and summarize the facts and arguments provided by the prosection and defence. The judge ensures that the process adopted by the jury in arriving at a verdict is valid.

In moving from insight to judgment, professionals test their understanding and seek to be free of illusion or error. Of course, accountants when 'being reasonable' need always to be aware of sources of bias within the spheres in which they operate (e.g., embedded bad practices, an unethical culture, etc.) and in themselves (prejudice, inappropriate use of heuristics [see Kahneman and Tversky, 2000] a closed mind, etc.). The overcoming of bias is a personal project and challenge requiring accountants to be open, share information about themselves, seek expert opinion when necessary, and test their views by again constantly asking questions. This is a difficult task, but once again other professions have developed a subculture and implemented mechanisms to promulgate appropriate behaviours. For example, surgeons compare their own findings to the research available on the procedure they have just completed to generate comparisons of their own experience with that of others. These new data can be a check on a doctor's performance, provide a reconciliation with the medical profession's 'corporate memory' and then be added to the collective data available.

The professional accounting bodies may need to look at how both the legal and the medical professions have facilitated this knowledge development. It is the authors' view that a focus on the internal process of accountants' decision-making techniques in the accounting education process will assist, but the role of the profession itself in facilitating such a change cannot be understated.

BEING RESPONSIBLE

At the fourth level a questioning professional has, through a careful collection of data, developed insights and established a reasoned position. Finally, the accountant needs to take responsibility for actions and ask, 'what are the issues and choices confronting me and how should I respond?'

For individual accountants to respond to this challenge they need to take into account the consequences of the choices entrusted to them. This requires accountants, having already assessed the possible outcomes and consequences of a decision, to contemplate the likely 'good' they intend from their actions. The term 'good' is used here in the sense that Finnis (1980) uses it, to describe a value that is desired for its own sake. It has three essential elements. First is instrumental good, without which the work cannot be performed. For accountants, instrumental good would include elements such as positive cash flow, acceptable performance, efficiency, quality and competent work. Second, there are higher order, honourable goods, that instrumental goods serve. These include the 'good of order' which includes ongoing competence, effective professional development and maintenance of reputation which all contribute to public trust in accountants. Honourable goods also include a set of universal basic human goods common to all people. This set includes the value of life itself, achievement through work, knowledge and truth (Finis, 1980, pp. 86–9). If accountants are to act responsibly, instrumental goods should not be in conflict with honourable goods, yet corporate failures indicate that they frequently are. Accountants cannot aim exclusively for the satisfaction of instrumental goods without considering the impact this has on honourable goods where public trust in accountants may be threatened.

The process of reflective enquiry allows the accounting professional to do this. Good performs the same role in decision-making that a pneumatic tyre performs for a car wheel (see Figure 3). It affords a protective barrier to cushion the decision-making process and the accountant from consequences that have not been foreseen, and the internal and environmental bias that can deflate the protection provided by good.

The four significant elements in Lonergan's model can be aggregated into two broad steps. First, in developing ethical judgment a person needs to gain insight into what has happened by gathering all relevant data, understanding them fully and judging what is the best explanation of what has occurred. Second, a decision should be made that incorporates a thorough understanding of the parties affected and the values that they will apply to that decision, identifying any possible conflicts of interest between the decision-maker and those affected by the decision.

It is easy to skip one or both of these steps or be lulled into suppressing them. There are several factors that can blind the accountant to their ethical obligations, especially in organizational settings.

Argyris used the term 'single loop learning' to describe system adjustments exemplified by budget variances that are used as levers to correct errors. Management information systems and audits are predicated on single loop learning with an underlying reliance on extant modes of thinking and action (1986, p. 113). We know that managers often conspire not to ask themselves questions that would embarrass them or cause them conflict (Beer, 1996, pp. 10–11).

Paradoxically, the reasoning and skills applied to complex problems are frequently counterproductive. At meetings there is a desire by members to minimize expression of negative feelings. This might be seen as a loss of faith in the CEO, in a culture where corporate leadership is seen as more individual than collegiate (Charkham, 1994). At meetings there is pressure to minimize expression of negative feelings, as this is seen as an inability to control oneself. Thus hot issues get cooled. This tends to ensure basic changes are not made unless someone breaks the group 'rules' (Argyris, 1986; Argyris and Schon, 1996).

The stakeholder view of organizations appears to offer an ethical focus for management, but may be only a variant of the shareholder value perspective. If the goal of the business is to maximize profit within constraints set by stakeholders, then stakeholders are not fundamental to organizational goals but a constraint upon them. The stakeholder view can be seen as a compromise in which stakeholders are seen as competitors for organizational benefits, with management conducting a trade-off between stakeholders so that management determines what each party is entitled to rather than what they deserve for the good of the community (Stebbins, 1997, p. 8; Procario-Foley and MacLaughlin, 2003, p. 289). James Hardie Industries Limited (JHIL) in Australia tried to buy off the asbestos victim stakeholder in the business by establishing a Foundation into which management believed they had put a sufficient share of the company's resources—that is, they had done the 'ethical thing' by asbestos victims—even though actuarial calculations at the time disputed the sufficiency of the funds made available, and the deficiency was extreme (Jackson, 2004, Vol. 1, p. 25).

Such a narrow view of ethics isolates the managers and their advisers from the rest of the community. Accounting aids such isolation by quantifying and distancing the actors so that the consequences of management action is focused on accounting quantities—profit and cost—not on the effects on other human beings (McPhail, 2001, p. 281).

By increasing the emotional distance between management and those affected by their actions, moral responsibility for 'the other' can be effectively silenced, as Bauman demonstrated with regard to the role of German bureaucrats in relation to the Holocaust. The expertise vested in management and their specialist advisors provides the capacity to rely on experts who deem certain actions as necessary even where these conflict with individual moral codes (Bauman, 1989, pp. 184–98). In the James Hardie case already mentioned, the potentially growing number of asbestos victims who might claim against the company were referred to as a 'legacy issue' that could affect 'value creation' for shareholders. Concerns expressed by former asbestos workers, unions, the press and the community were referred to as 'noise about separation' (Jackson, 2004, Annexure K, p. 129). Under such circumstances moral behaviour may be perceived by management as subversive and anti-social.

To counteract these tendencies in organizations to shift focus away from assumptions on which measures are based, in arriving at consensus decisions and in adopting a cost benefit analysis with stakeholders, individual accountants require a strong moral compass and an understanding that responsibility to others is ultimately unconditional and always remains an individual responsibility.

We will use one example of how current views on ethics appear to get it wrong and where Lonergan's model may help overcome the problems identified. To see the relevance of Lonergan's ethical reasoning model for accounting practice we will look at the accounting treatment of leases, where we believe there are some fundamental ethical issues that the accounting profession and accountants have systematically overlooked or ignored. Accounting standard AASB 117 (equivalent to IAS 17) on accounting for leases requires a lease to be classified as a finance lease where it 'transfers substantially all the risks and rewards incidental to ownership' or as an operating lease (AASB 117, para. 8). The standard goes on to state that '[w]hether a lease is a finance lease or an operating lease depends on the substance of the transaction rather than the form of the contract' (AASB 117, para. 10). Indicators of where a lease would be normally classified as a finance lease include: transfer of ownership at the end of the lease, existence of a purchase option, the lease term represents a major part of the asset's economic life, the specialized nature of the leased asset, losses being borne by the lessee on cancellation of the lease, and the availability of subsequent lease periods (AASB 117, 2004, paras 10–11).

Classifying a lease as a finance lease has repercussions for the financial statements as a lease asset and a lease liability are created and lease interest and amortization charges flow through the income statement. If the volume of operating lease commitments is growing, evident over the past two decades, the increase in total assets and total liabilities and change in net income may have a significant impact on key financial ratios—namely return on assets, return on equity, and debt to equity (Imhoff *et al.*, 1997, p. 13; Beattie *et al.*, 1998, pp. 245–51).

The standard was first issued in Australia in 1987 as AASB 1008, *Accounting for Leases*, after a rapid growth in lease finance arrangements and concerns in the accounting profession that some listed companies could use lease finance to avoid disclosure of major debt contracts. There was some evidence that non-disclosure of lease commitments and payments was more likely where a company's debt to assets ratio was high (Bazley *et al.*, 1985, pp. 55–6). The standard appeared particularly relevant after the 1989 collapse of Budget Corporation Limited, a company with assets of $32 million, liabilities of $35 million and undisclosed lease commitments of $101 million (Sykes, 1994, pp. 528–31).

Almost as soon as AASB 1008 was published, banks and other finance companies were quick to publicize their capacity to convert any finance lease into an operating lease and thus maintain lease payments as a cost rather than as an asset and a liability in the financial statements of lessees. Also during this period the volume of operating lease commitments was growing rapidly, providing companies with a form of off-balance sheet financing and corporate annual operating lease commitments far outstripped finance lease commitments (Beattie *et al.*, 1998, p. 233), yet the accounting profession remained curiously mute with regard to the impact the standard was having on disclosure of lease financing arrangements.

In the intervening period, the accounting standard on leases has not changed in substance, but the volume of leasing finance has continued to expand, whereas the quantum of finance leases appearing in the financial statements of corporate Australia has remained tiny. The value of finance leases to total lease commitments for a sample of the largest 525 companies (excluding banks and property trusts) listed on the Australian Securities Exchange fell in the years 2002 to 2006 from 4 per cent to just 1 per cent (see Table 1).[7]

These figures indicate that finance leases are an unpopular form of financing. There is evidence, however, that the impact of off-balance sheet financing including operating leases is not ignored by the markets and some analysts will capitalize lease financing when calculating financial ratios used to compare, predict and evaluate

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[7] Data supplied by Corporate Scorecard, an Australian provider of financial risk management and ratings services to government and major companies.

TABLE 1

LEASE CLASSIFICATION IN AUSTRALIA, 2002–06

	Corporate Australia			
Year	Operating lease commitments A $ million	Lease liabilities B $ million	Total lease commitments C = A + B $ million	Lease liabilities as % of total liabilities B/C
2002	58,040	2,255	60,295	3.74%
2003	69,630	2,078	71,708	2.90%
2004	72,422	2,701	75,123	3.60%
2005	74,753	700	75,453	0.93%
2006	68,016	695	68,711	1.01%

Source: Corporate Scorecard, aggregation of leasing data collected from 525 listed companies, 2002–06.

corporate financial risk and performance (Imhoff *et al.*, 1997, p. 13). By constructively capitalizing operating leases as finance leases, researchers have shown that assets and liabilities can change significantly and have a marked impact on any assessment of performance and risk and thus have significant economic consequences for an evaluation of any particular company (Beattie *et al.*, 1998, p. 253).

The situation with leases is one that affects a large number of accountants—as approvers of accounting standards, as preparers of corporate financial statements, and as auditors of corporate financial statements. The fundamental question to be asked is whether there is a genuine rental agreement that the lessee can walk away from or whether it is a purchase of an asset acquired with a loan. AASB 117 requires those applying the standard to focus on the substance of the transaction not its form. Applying Lonergan's approach, the accountants would collect relevant data and ascertain the basic nature of each lease arrangement.

If we rely on bank and finance company advertising in the early 1990s, accountants appear to have used the indicators of the existence of a finance lease in AASB 117 as exhaustive rules to be applied to ensure that most leases were classified as operating leases. However, meeting the rules for an operating lease does not provide any guarantee that the lease arrangement does not transfer the risks and rewards of ownership. The rules are not exhaustive, merely suggestive (Cheffers and Pakaluk, 2005, pp. 46–8). Even applying these rules, accountants need to ensure that they have accumulated sufficient evidence to judge the appropriate classification of leases.

What we may be observing with lease classification is an example of ethics as rule-following (Kohlberg's conventional moral reasoning) rather than judgment about whether the lease classification method adopted provides the best explanation of what has occurred (understanding and insight).

We suspect that accountants and auditors overlook the insight that links lease classification with the provision of useful information for decision-making. For example, does the evidence of minimal finance lease classification expose a reluctance of management to classify a lease as a finance lease, or does it indicate that the finance lease classification has no information content, or does it signify that it possesses too much information content that management would rather not disclose? Arriving at such an insight will tell accountants why the standard has been interpreted the way that it has, and what may need to be done to remedy the situation.

From the standard setter's perspective, if there are so few finance leases in the corporate sector what was the need for the standard in the first place? Why did the standard setters not react when banks and other financiers moved to emasculate the standard's impact? Did the standard setters believe that by setting the standard they had done their work and its interpretation was a subject for practising accountants and auditors who would somehow get it right? We know that some analysts go to the expense of adjusting operating lease payments to arrive at surrogate lease assets and liabilities, so the classification of leases as operating rather than finance leases is not a trivial issue. This oversight, where the actual consequences of the standard are ignored for the presumed consequences that did not follow, indicates an inability of the standard and its setters to cope with consequences that they had not imagined.

Classification of leases would rarely be seen by accountants as something that involves community values. Yet we know that the decision to classify a lease is based on values relevant to management and lease classification decisions will possibly affect the decisions of parties involved with the company. The objective of financial reporting is to provide information about the financial position, financial performance and cash flows of an entity that is useful to a wide range of users in making economic decisions (AASB, 2004, para. 12). The accountant needs to decide whether incorrect lease classification can have an effect on those affected by lease classification decisions and what values those parties would like to see applied to the classification decision. Where a company can report all its leases as operating leases it is possible that lease payments, assets and liabilities simply disappear from the financial statements and one is left to interpret the disclosure of lease commitments. As Imhoff *et al.* (1997) have demonstrated, converting lease obligations into assets and liabilities may significantly change some ratios used in evaluating performance (Beatie *et al.*, 1997).

Focusing on lease classification raises other questions. Does the classification of leases give the impression that reported profits are better than are actually the case? Is management benefiting from bonuses based on these calculations? Does financial performance appear to be better than it really is so that shareholders and employees are lulled into a false sense of security? Do suppliers have false confidence in the company's prospects?

It is apparent that the ethical aspects of accounting are likely to disappear once there is authority for the action taken (AASB 117) and the actions are routinized (through application of specific rules) so that the stakeholders and their decisions are effectively excluded as part of the calculus (see Bauman, 1989, p. 21).

We cannot know what impact lease classification has on the community until—as with the case of Budget Corporation—a company collapses and its lease commitments are exposed as a major claim against assets. Accountants generally avoid any analysis of the values of parties affected by financial statements as such values tend to be triggered only when the community knows the financial statements do not portray the actual economic position of the company, that is, in times of distress. The recurrence of corporate collapses—of which Enron was just one in a long list—makes it difficult to understand the attitude of the standard setter and the accounting bodies to matters such as the appropriate classification of leases, at least in terms of trying to avoid criticism when the next spate of company crashes occurs.

Having introduced accounting rules, the accounting bodies appear to walk away believing their work is complete. The work is never complete, as the social structure, of which accounting is a part, is constantly under stress so that the relevance of existing accounting rules and methods needs to be continually addressed to ascertain whether their application still provides the information decision-makers need. The existing standard on leases is a work in progress that should have received more attention in the last twenty years, but appears—despite criticism of its effect—to be awaiting the next spate of corporate collapses that involve large lease obligations.

The dynamics of the enquiry-based social structure of accounting mean that we are dealing with a process that may perpetually be turning in on itself. The image of the golf player may be illustrative here. Each successive set of questions provides drive for the process, much as the desire to improve a handicap does for the golf enthusiast. Golf players often focus on their handicap rather than the person they may be playing with. They will question their equipment, their grip, their swing, their stance, their approach and their mood in the search for a lower handicap. For the accountant the set of questions selected and the responses to them can and often do result in a change of direction. Accountants need to focus constantly on the issues at hand to ensure that they are doing sufficient research, making interpretations that provide correct insights, ascertaining the reality they are faced by, acting responsibly and making choices that satisfy the interests of all stakeholders. These are onerous and never-ending responsibilities. Progress is determined by monitoring the outcomes of action against the insight that leads to further action and the good that the accountant is seeking to serve. Like the golf enthusiast, the aim is for the accountant to get to the end of the process knowing that each step has been considered thoroughly and thoughtfully. The model allows practitioners to visualize and focus on this process holistically, providing a structure of control that allows them to mind their own thinking processes (see the minder in Figure 3). The structure of control allows the accountant to monitor where he or she is in the decision-making process, keeping in mind all the others steps necessary to ensure there is consistency in the use of the model.

To some degree the process is endless if a socially sustainable profession is to be developed and maintained. The game proceeds full circle, and the next round takes up fresh data to be interpreted and tested, creating new knowledge and understanding and giving rise to fresh rounds of dialectic to contest new positions in a similar fashion to the approach underpinning evidence-based medicine. Like the doctor, at this fourth level accountants needs to engage in dialectic with their peers and stakeholders to test their insights. It is this dialectic that brings to light the different understanding and conceptions of truth that each doctor or accountant may arrive at. This ongoing process spells out the possible positions that a professional may take, with the object of making a decision in a manner that reflects the values transferred to the accountant by all those stakeholders affected by the action to be taken. The application of such a process, we assert, will more likely result in decisions that the accountant believes are based on the truth as they see it. It is this search for truth that provides accountants with the reputation for ethical practice desired by all those who rely on accounting information. Our assertion will need to be tested against the criteria used by accountants to apply it, as well as the outcomes generated, as unforseen factors can play havoc with the best designed and well-intentioned decision processes.

CONCLUSION

The positive approach that informs much research into governance assumes a fact-value dichotomy with value-laden statements not being susceptible to empirical testing because they lack objectivity (Simon, 1976). Positivists steer away from ethical issues as being unsuitable for rational analysis. As Stewart (1988) points out, an alternative approach, the 'good reasons' approach, says that ethical positions and decision choices can be rationally evaluated by observing the arguments used to support them. Lonergan takes this a step further by demonstrating that a four-stage structure of control is consistent with a structure of objective decision-making. The decision-maker experiences, understands, and then judges the truth or existence of alternative courses of action. In making a choice between alternatives, the decision-maker additionally judges the value of each alternative. For Lonergan, objectivity and integrity are achieved by overcoming bias and prejudice when making judgments and decisions, driven by our unique, inherent desire to know and understand. A true judgment is one that can satisfactorily answer all the questions posed at any one time. It is exemplified by the precepts, 'be attentive, be intelligent, be reasonable and be responsible' (1957, pp. 399–409).

As with the medical or legal practitioner, it is rare for an accountant to have perfect certainty when confronting a professional problem or issue. All professions can seriously err by prematurely reaching judgment and stopping all further questions. It is a common mistake to make judgments on the basis of incomplete or faulty data. It is also a common mistake to jump from data to judgment, bypassing insight and explanation. The solution to overcome these risks requires constant, frank, vigorous and open questioning and discussion between accountants, their peers and clients on all critical decisions.

Accountants need to realize that they can help themselves to be better questioners by understanding the internal process of decision-making. The model outlined in this article is suggested as an aid in this task. If the accounting profession is serious in its attempts to reduce unethical decision practices by its membership—as the establishment of the AASB in Australia, the Auditing Practices Board in the U.K. and the Public Oversight Board in the U.S. certainly indicate—then the profession can make a major contribution to the efficient workings of the information economy by facilitating or sponsoring greater understanding by members of their own decision-making processes. The professional accounting bodies across the world need to help individual accountants to become better questioners by providing and promoting processes that encourage research and reflection and, as a profession, acknowledging and encouraging the premise that questioning is a fundamental contribution to the pursuit of truth.

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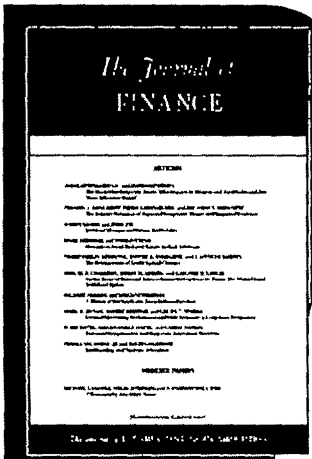

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